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ON THE IMPORTANCE OF SIMPLE PHYSICAL AND PSYCHICAL METHODS OF TREATMENT.[1]

By William Sydney Thayer, M. D.,

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In accepting the kind invitation of your president to speak before you this evening, it has occurred to me that it may not be out of place to express a few thoughts with regard to the importance of certain simpler physical and psychical methods of treatment of disease. That which I am about to say may seem trite to many in this audience, and yet, although the conditions to which I am about to refer are tacitly recognized by many, nevertheless, as a profession, we have been rather slow to meet them as we should. We must all agree that the end of the efforts and studies of the physician should be to prevent or heal or ameliorate disease—to further and perfect the *art of medicine*. And while recognizing our inefficiency and helplessness in many respects, we must realize what enormous advances have been made in recent years. If one looks back, however, at the history of medicine during the last century he cannot fail to be impressed with the fact that the first nine decades of the nineteenth century, associated as they were, with progress in the medical sciences, such as has rarely been recorded in a like period of time, were yet not to a like degree fruitful in advance in the *art of practice*.

Based on the anatomical foundations laid by Morgagni and Bichat and extended by such men as Müller, Schültze, and Virchow, a brilliant line of students, Auenbrugger, Laënnec, Corvisart, Skoda, and others introduced accurate methods of detecting changes in organs and tissues *intra vitam*. At the same time their associates and followers, Bright, Addison, Bouillaud, Schönlein, Louis, and Trousseau, not to speak of their numerous living students and successors, by careful and acute clinical studies, laboriously correlated with the anatomical appearances at autopsy, developed a degree of diagnostic exactitude which transformed medicine. And this period of anatomical study was associated with and followed by the great awakening in physiology and experimental medicine started by Magendie and continued by Claude Bernard, and later by the brilliant bacteriological and parasitological studies initiated by Pasteur and Koch, and by that progress in physiological chemistry which is throwing day by day more light upon the functions of the human body in health and disease.

But throughout the greater part of the last century the minds of the bulk of active scientific investigators were occupied with the anatomical, physiological, and bacteriological study of disease, and the clinical application of their methods and results to *diagnosis*. At the same time a realization of the folly of the old, blind expectations as to the specific action of many drugs and the possibility of influencing regressive structural changes by medicine, brought about, it must be acknowledged, a certain therapeutic pessimism. The medical world became more and more interested in *sedibus et*

[1] Delivered before the Louisiana State Medical Society at New Orleans, May 14, 1907, and appearing in the N. O. Med. & Surg. Journal.

causis morborum in which discoveries were daily made, than in attempts to detect new methods of treatment. Some of our medical clinics became, as has been said, great diagnostic institutes.

While among the wiser members of the profession this interest in pathological anatomy and bacteriology and chemistry, in the scientific study of disease, and the realization of the folly and vanity of random experiment on the human being with new drugs with the expectation of finding new medicines with specific action against disease, brought about only a judicious conservatism in practice, yet, in other less balanced minds, an overpowering interest in one side of the question led to a lack of that attention to the details of the art of healing which, after all, is the final duty of the physician to his patient.

But it cannot be said that the condition of the patient suffered. In those very clinics which were most criticised and most vehemently accused of therapeutic nihilism the treatment of the patient was steadily improving. The delivery from poly-pharmacy, the employment of the simpler physical means of treatment, instead of constant, aimless experiment with drugs, with the action of which we were wholly unfamiliar, and which more often than not were harmful rather than beneficial—these were great blessings. But the tree of medical science had not yet begun to bear its first fruit of real improvements in the art of healing. In the last twenty years, however, great changes have come to pass. The introduction of scientific methods of study into certain branches of medicine have inevitably brought about habits of more exact thinking in other branches. Let us consider for a moment some of the changes which have been taking place in the practice of medicine as a result of the development of more scientific methods.

(1) As I have already said, men trained in exact methods of thought and action could not fail to realize the folly and danger of an indiscriminate use of drugs. Several years ago, while reading, on a railway train, a book lent me by a distinguished teacher and master, whose name many of you may guess, I found on a slip of paper between the leaves, the sketch of a thought upon this very question which expressed well that which we should feel. What surprising and unlooked-for reactions might occur if we were to drop chemicals at random into a glass found standing in a laboratory and containing a fluid of unknown constitution! We might well hesitate to risk the experiment. And yet, as physicians, we have been in the habit of introducing thoughtlessly into the complex chemical fluids of the body, an infinite variety of substances with the nature of which we are too often unfamiliar, without the least conception of what far-reaching evil effects our act might have. This may seem an exaggerated statement. But let me take one example. Nearly twenty years ago, a new antipyretic, highly recommended—as they always are—was placed in the hands of the profession. This was used on a number of patients in the wards of a large hospital. Ill effects were soon noticed. Experiments were made upon animals and the drug was found to be one of the most powerful destroyers of the blood with which we are familiar. Only a few months ago it was chosen by one of my colleagues as the best type of poison to administer to animals for the purpose of producing experimental anæmia, in order to study the regenerative changes in the bone marrow. Its constitution was not unlike that of other antipyretics which are relatively harmless in their effect, and to its thoughtless use in different parts of the world we cannot doubt that many human lives were sacrificed. The harm which may be done by the pointless and careless use of drugs often outweighs any possible advantages. We are coming to realize that as far as possible we should use only drugs, the physiological action of which we understand, and which can be easily controlled. We must, as physicians, know what we are doing and consider carefully before entering on medical experiments. And experimental physiology and pharmacology are reproducing and solving for us many a problem which, in the human being, would be difficult or impossible to approach.

(2) One of the first and most brilliant advances in therapy dependent upon careful physiological study and observation was the introduction by George Murray of thyroid feeding in the treatment of myxœdema and cretinism. It is true that no similar animal extract has as yet proved of like efficacy, but the discovery has opened a hopeful field for future study and the recent observations of MacCallum concerning the use of the extract of parathyroid glands in tetany, may prove of almost equal importance.

(3) Consider again the immense progress associated with the development of the use of the antitoxine of diphtheria, and to a lesser extent, that of tetanus; with the hopeful action of preventive vaccines against typhoid fever, cholera, dysentery, and plague, and the studies upon opsonic immunity—the opening of the whole field of specific serum prophylaxis and therapy.

One must, with regret, pass with a mere word of reference the wonderful results of preventive medicine in yellow fever, malaria, plague, and cholera, which have been achieved through systematic scientific study of the nature of these diseases, their mode of transmission, and the conditions under which they prevail.

(4) The fascinating investigations of Ehrlich and his students as to the manner of action of various chemical substances in different infections give us ground for hope that ere long principles and laws may be discovered, the therapeutic value of which we cannot to-day estimate. Everywhere there are signs of re-awakening of therapeutic enthusiasm—an enthusiasm based on the fact that the seeds which science has so patiently and sedulously sown are germinating and bringing forth a new therapeutic art, born of research and experiment, accurate thinking and reason—widely different from the blind empiricism of the past.

(5) Almost equally important, though not perhaps as brilliant as these more specific measures, is the awakening which is gradually coming over the profession with regard to the enormous therapeutic reservoir which we have in the rational and carefully planned application of the more simple physical

and mental methods of treatment. Few of us often consider the part that the pure physical and psychical methods of treatment play in the care of the great majority of maladies which come under our observation. It is no exaggeration to say that these methods are the most important that we have. The difference between modern therapy, or, we must probably say, the therapy of the near future, and that of the past, is going to be, it seems to me, largely the difference between using these methods blindly and without a realization of what we are doing on the one hand, and on the other, of applying them intelligently and with a full conception of the opportunities which lie before us. As it is, we are only beginning. We often forget and neglect.

Let us take a few examples and consider that which we do and that which we might accomplish.

If one of us be tired and worn out from loss of sleep, what do we do? Is our first act to take a tonic? No. It is, if we can, to rest and sleep.

If, from overwork and strain, we find ourselves nervous and perhaps sleepless, what do we seek to do? To take a hypnotic? No. If possible, we take a vacation. And we know that if we can get away from the hurry and cares of daily duties we shall recover immediately. The tonic and the hypnotic are makeshifts—and sometimes dangerous makeshifts.

If there come to us a woman who, in the same way, from constant strain and care, added, it may be, to an inherent instability of body or mind, has become worn out, introspective, and neurotic, do we not to-day realize that in the majority of cases that which will best start her on the right path is to separate her from her surroundings, to put her to bed, to give her a trained nurse who shall have had experience in caring for individuals in like nervous or mental conditions; to carefully re-educate, as the popular term now is, the digestive functions, by beginning with the simplest and most limited nourishment, gradually progressing until the patient, without realizing the fact, is taking a full diet; by the induction of medical obedience; by constant and carefully planned mental encouragement and stimulation, and later, by exciting the patient's interest in some bodily or mental occupation, to take her mind from herself, while at the same time, by the use of massage, baths, packs, and perhaps electrical treatment, the skin is kept in good condition and the muscles in such a degree of nutrition that, when she again seeks to use them, she may find herself reconstituted in body as well as in mind? This is what the Weir Mitchell rest cure, lately so ably set forth by Dubois, means. When, after two or three months, the patients, as they often do, return better and stronger than they have been for years, we hardly realize that the treatment which they have received has been purely physical and psychical, that those medicines which have been employed, if indeed, any have been employed, have played a wholly secondary part.

Again, let us consider the conditions in typhoid fever. We have for some time realized well enough that it is useless to attempt to treat locally and by internal medication that which long before the time it is recognized, has been a general septicæmia. To expect to cure typhoid fever by disinfecting the intestinal tract, even if it could be done, would be just as absurd as expecting to cure a case of secondary syphilis by local treatment of the cutaneous manifestations. What do we do? The first thing on which we insist in the treatment of a case of typhoid fever is physical rest, that the heart and muscles which are already weakened by the circulating toxic substances may not be overstrained. We regulate the diet so that the patient may be supported as far as may be, that the loss of body nitrogen may be kept at the lowest possible point, while yet avoiding such nourishment as may in any way interfere with the somewhat impaired digestive processes. We use cold water in the form of baths or spongings or packs for its remarkably stimulating effect on the general mental and nervous condition of the patient, and for the apparent benefit which results from the coincident lowering of the temperature. But what we often forget is that such baths and spongings should always be associated with careful massage. It is one of the commonest defects in our treatment of typhoid fever, and other prolonged maladies, febrile and afebrile, that we forget to look out for the condition of the muscles. We should never think of putting a neurasthenic upon a prolonged rest cure without insisting upon massage and hydro-therapy in its various forms in order to prevent the atrophy which follows long disuse; but in these other conditions in which, as in typhoid fever, there is greater muscular degeneration as a result of the toxæmia, we too often entirely forget the great importance of massage, and abandon it, if it have been given, with the falling temperature and the discontinuance of the baths. Every typhoid fever patient, after his temperature has fallen, should still have at least one alcohol sponging associated with thorough general massage daily. It is surprising to see the difference in the strength of a patient with pneumonia, for instance, who is given general massage as soon as his temperature falls to normal, and that of the man who passes his convalescence entirely at rest. The one finds his legs strong and ready to bear him; the other, with a heart weakened by disease, finds his muscles far less able than they were before to support him; extra effort is required, more strain is put upon the heart, and the process of learning to walk again is a far more serious matter. There is, it seems to me, really greater need for proper attention to the muscles in typhoid fever and in convalescence from pneumonia than in the treatment of a neurasthenic.

The same applies to the treatment of patients with all manner of surgical injuries. The difference between the condition of him whose muscles have been carefully attended to and that of his fellow who arises with a general atrophy of disuse is enormous and can be appreciated only by one who has seen the two conditions.

Consider for a moment the treatment of diseases of the heart, muscular or valvular. Rest and regulation of the manner of life of the patient are here the essential features—medicines should be the last resort. There are conditions of lack of compensation in which rest alone is of course insufficient, where the brilliant effects of digitalis, diuretics, and

purgatives are happily familiar. But excepting at such a period, the problem in the great bulk of conditions associated with weakened heart, is another. It is a question of bringing the heart back into training. The task before the patient with a dilated heart differs from that which is to be met by the young man who is training for a race only in degree. On the one hand, it is a question of taking steps to prepare normal muscles and a normal heart to withstand extraordinary effort. On the other, 'tis to prepare a weakened heart to bear burdens which, for a healthy man, would be normal. The brilliant results so often obtained at Nauheim and elsewhere by the application of those measures elaborated by Schott and others, which consist simply in lessening the burdens of the heart through the baths and by gradualllly training it to increased effort by means of carefully graduated and progressively increased resistance movements, show how much can be accomplished by the simplest physical measures when carried out in an exact and painstaking manner, according to a carefully laid and scientifically controlled plan of action. Only with loss of compensation—that loss of compensation which may be so long delayed by purely physical methods of treatment—do we fall back upon digitalis to save the day. And at the very end, when digitalis has failed, it is the lancet which gives the patient a new lease of life.

Let us consider again the treatment of a colitis, say an amœbic dysentery. The first necessity is absolute physical rest; next, regulation of the diet, and lastly, the question of medicine. And medicine by the mouth, as we so well know, is of little value here. In the end it comes to the use of irrigation of the colon with water judiciously medicated.

Similar considerations apply to the treatment of pulmonary tuberculosis. In no disease have so many drugs been employed; in no disease have so many fantastic methods of treatment been advised; in no disease are the essentials so well met by the careful carrying out of simple physical and psychical methods. Absolute rest, especially if there be fever. Freedom from care and responsibility. Careful attention to the diet. Life in the open. Above all, the placing of the patient in a position in which, from a mental standpoint, he may be encouraged and stimulated. In no disease is attention to the environment of the patient—the importance of which has been so ably emphasized by James—more necessary than in pulmonary tuberculosis. Year after year hosts of poor consumptives go forth in search of that far-off climate which, alone and unaided, is to bring them back to health. As well might they seek the fountain of youth! Allured by the enchantment of distance, they abandon the comforts of home, the restraining influence of wise advisers, the encouragement of companionship and example, for a cheap boarding-house or the solitude of the plains, and strangers in a strange land, homesick and doubting, writing thousands of miles for the advice which should be near at hand, they die in the midst of that paradise of which they had dreamed for the want of the hundred little physical attentions and mental stimuli which are the most important elements in the care of the tuberculous patient. The psychical stimulation associated with treatment in sanitaria is not the smallest element in its success.

One might go on through the whole list of human ills, not excluding those for which we happily possess drugs with specific effect. Indeed it may be worth while to refer briefly to the necessity of attention to the simple physical and mental side of the treatment of disease such as syphilis and malaria, types of the latter maladies. I think of a specific instance—a colleague who consulted me some years ago, with grave involvement of the central nervous system following accidental luetic infection in the practice of his profession. Despite vigorous treatment he had grown progressively worse. The outlook seemed almost hopeless. But it was noted that he had attempted to combine the treatment with attention to his daily duties. It was insisted that he leave home, take to his bed and put himself under the absolute control of a wise physician and nurse. Six months later a robust, healthy looking man entered my consulting room—I had not known him. The medication had not varied essentially from that which he had given himself, but the physical rest, the freedom from care and responsibility, the attention to his general bodily condition, and the mental encouragement and stimulation had turned the scale. 'Tis a common picture.

In like manner we are all familiar enough with the ease with which the milder forms of malaria may be treated, if the patient be willing to spend a few days away from work and at rest; how much less quinine will accomplish a good result, while the necessity of rest in the treatment of the severer forms of the disease needs no mention.

It is undoubtedly true that wiser physicians always have recognized and taken advantage of these facts. True success in practice is usually dependent upon the attention of the physician to the little physical and psychical details of his work. But the world at large takes a very different view of the practice of physic and it is ever amazing to see how deep-rooted is its faith in medical magic. Nevertheless, the public is slowly and half unconsciously beginning to appreciate these things. One of the most interesting evidences of this is in the rise and development of the trained nurse. What does the patient mean when he says, as he so often does, that, after all, a good nurse is more important than a physician? He means that the measures carried out by the trained nurse, the care she has taken of his skin, his muscles, the judicious preparation and administration of his diet, the little attentions which promote his general physical comfort, the confidence inspired by her cheerful and tactful behavior, have had more to do with his recovery than any other prescription that the doctor has given him—and he is right.

And what does our increasing dependence on the trained nurse mean? It means simply that we know that physical and psychical details of treatment are the most powerful measures which we can apply in our efforts to bring our patient back to health—that we have in the nurse an individual highly trained in the application of these measures.

What, indeed, is the secret of the success of that gentry who use their hands so much better than they use their heads, the

so-called Osteopaths? Is it not in great part that, by practice and experience, many have become fairly skilled masseurs whose treatment is of real value to the admiring patients whose "dislocated" vertebræ they so marvelously manipulate?

But why have I dwelt so long upon these rather simple points? Because it seems to me true that although many of us may realize where our power lies, we have been delivering over the application of these important methods of treatment to the trained nurse and to the surgeon, while standing aloof, in some instances with a traditional and pharisaical pride in the thought that we are not as the osteopath—we use our heads only—not our hands—an attitude which is a fatal stumbling-block to progress in the *art of medicine*.

Must we not, on reflection, be painfully conscious that not one of us has ever been properly instructed in massage, and that few of us are familiar with the many ways in which hot and cold water may be used to advantage? And if, indeed, one of us have worked in a part of the world where methods of physical therapy are properly taught, where is he to find the establishment in which his prescriptions can be suitably carried out?

The tired business man consults us in the summer. He cannot take a vacation; he has no horse. The country club where he might take the several afternoons a week of golf which would do him so much good, is too far away. A few hours a week of suitable hydro-therapy and massage and Swedish movements would give him an excellent substitute for the life and exercise in the open which is the medicine that he needs. But what have we, as a rule, at hand? Only the Turkish bath, which is often far too exhausting for a man in his condition, and the charlatan who poisons his mind and plunders his pocket.

In one city an interesting beginning has been made. A few years ago several members of the medical profession, recognizing the need of an institution for hydro-therapy, massage and other methods of physical treatment, succeeded in raising a moderate sum of money, as a result of which suitable rooms were obtained and fitted out with a satisfactory system of baths. A male and a female attendant were appointed, each trained in massage and Swedish movements. The establishment was put in charge of a young physician who was well qualified by study and experience. The institution is open in the morning for women, in the afternoon for men. The physician under whose general charge the establishment is placed—who, by the way, is an active man in all respects—a teacher and an investigator—has published a small pamphlet with a description of the various methods of hydro-therapy and the conditions under which they may be best applied. A patient may be sent with definite prescriptions for whatever treatment may be desired and this is faithfully carried out by the attendants. A moderate fixed fee is charged for each treatment. After two years the establishment became self-supporting and now it is making a good income, which might well, some day, be applied toward the establishment of a department for thorough instruction in methods of physical therapy in a neighboring university. I wish that I might say that this institution were in Baltimore.

In general, however, we are sadly behind our colleagues on the continent. In connection now with many of the better hospitals, there are properly organized institutes for physical therapy—institutes to which a patient may be sent for massage, for the various forms of hydro-therapy or for fitting exercises. I know of but one hospital in this country which has a thoroughly developed department of this sort. At the Massachusetts General Hospital, through the generosity of a lady in Boston, there is a complete set of Zander apparatus which has been of the very greatest assistance, while of late a system of baths has been added.

That upon which I would particularly insist is that we are neglecting a very important feature of medical education. We should give more time in our schools and hospitals to instruction in the *care of the patient* in its more literal sense. Courses should be given to the students in the essentials of nursing. The student, as well as the nurse, should be trained in massage, in Swedish movements, in hydro-therapy, in electro-therapy. Few physicians in active practice may have time to give massage personally. But many a young man could accomplish much were he able to give proper massage and to direct specifically suitable measures for the physical development of the tired, nervous patient, who now receives, if he be lucky, a little advice which he cannot carry out and a prescription for tincture of nux vomica, or, all too frequently, alas, a depleting diet and an elaborate course of medicinal treatment directed at his poor stomach, which, tired with the rest of his frame, has happened to attract his special attention and has been made the scapegoat.

If this be true with regard to the simpler physical methods of treatment, how true is it also in connection with the psychical influence which the physician should exert on his patient. As has been said above, true success in practice has always depended on the attention of the physician to the little physical and psychical details of his work. The encouragement, the stimulation, the mental lift which the good physician gives to his patient are the most important elements in his practice. This you may say is nothing new. No, indeed, it is probably as old as man, and as has been said, many thoughtful, conscientious physicians fully understand it. They realize that the good which they accomplish depends not so much upon the contents of their prescriptions, as on the time which they give to their patients, on the honesty and simplicity with which they explain to them the nature of their condition, and the earnestness with which they give of their own store of common sense and reason and optimism to the doubting and anxious invalid.

But do we always reflect that this power of suggestion, this mental control which the physician should exert over the patient is not universally comprehended? And is it not true that before our students we rarely insist upon such matters as clearly as we ought? We are rather accustomed to expect them to absorb these conceptions by intuition—and the results are sometimes odd. I think of an amusing example which

may serve as an excellent illustration. A young woman left a medical school at the end of her third year and became a Christian Scientist. When asked the cause of her action she is said to have replied that she had discovered that her professor of medicine—a most successful practitioner—was after all, nothing more than a faith healer, and that she therefore felt it useless to go further.

Another instance of the lack of appreciation and realization of the most important powers which the physician can exert is the manner in which some of our colleagues tend to look upon the modern revival of interest in the analysis of the mental phenomena of disease and the more studied application of psychical methods of treatment. They seem to regard the rather ponderous and impressive term "psycho-therapy" as the symbol of some wholly new and mystical method of influencing their patients.

But the awakening of interest in the study and application of psychical methods of treatment is important and hopeful—and not its least importance lies, perhaps, in the fact that we are reminded that many have forgotten to teach their students —some have failed to realize themselves—that by the mental control which we gain over our patients we can often accomplish more than by any other means.

The so-called "Christian Scientist" has discovered this, finds for himself a satisfactory explanation in his circumscribed religion, and with a simple ignorance of the elements of the natural sciences, constructs a grotesque system, which, while helping some, leads many astray.

Many of our so-called Homœopathic brothers must realize well that 'tis rather their confident assertions than their dilutions that tide their patients over the passing malady.

The quack, having made peace with his conscience, knows that, by his fantastic advertisements and ludicrous promises he will always gain the confidence of and actually help a sufficient number to keep his pocket padded—the main end of his existence.

The maker and advertiser of proprietary medicines knows that the false statements printed on his bottles inspire a confidence that is of benefit to some; that the statements are false, that they cruelly deceive many, he may, perhaps, fail to consider.

But the physician does not always realize that that which superstition and ignorance and ill faith may accomplish, he too can do equally well by properly directed effort, honestly and intelligently, and if you will, scientifically.

Just as it is true that the general practitioner is called upon, as a rule, to apply only the simpler forms of physical therapy, so it is with regard to methods of psychical treatment. In all those conditions in the treatment of which the mental influence of the physician on the patient is especially called into play, the individual is a most important factor, and it will probably always be the case, that in the graver nervous and mental maladies, the best results will be obtained by men especially gifted and specially trained. But many a patient might be saved from a long nervous breakdown or from the hands of the quack and the charlatan, if we were to remember, ourselves, and to teach our students to give more time and thought to the care of the mental attitude of the sick. An hour's patient attention and explanation and encouragement will often do more for the sufferer than months of routine treatment.

These, gentlemen, are the conceptions which I have wished to bring before you. They are neither new nor original, but they have, nevertheless, a bearing of some importance on the practice of medicine.

It is, of course, needless to add that, if I have insisted upon the value of more studied attention to physical and psychical methods of treatment, it is not that I would in any way detract from the value of drugs or deny the necessity of a thorough knowledge of their physiological action. Drugs are of course indispensable in the practice of medicine. To say that there are few specifics, and to warn against the indiscriminate use of substances of uncertain constitution, is far from denying the value of medicines. It is only by knowing how to take advantage of every current, to catch every passing breath of air, that the skilful yachtsman wins the race. The administration of a drug, intelligently, at the right moment and in the right manner, may tide the patient over the crisis which had otherwise been fatal. But it is none the less true that had it not been for other vitally important physical and mental measures this opportunity might never have been offered.

THE PHYSICIAN AND SURGEON IN SHAKESPEARE.

By Arthur W. Meyer, M. D.,

Instructor in Anatomy at The Johns Hopkins University.

> "Under carved marble of thine own
> Sleep, rare tragedian, Shakespeare sleep alone."
> —*William Basse.*

To say that every genius has its satellites is but a very commonplace remark. Yet it is so easy to forget that the significance of many of these satellites has been misapprehended, that others have been completely forgotten, and that many more, no doubt, have remained as unnoticed upon the horizon of time as the stars by day, not even to be descried when the great central figure which eclipsed them was in its nadir. Thus it happens that the attention of posterity has been confined largely to the contemplation of the lives and the labors of its greatest forebears. The name of Hippocrates is daily on our lips, but the names of those who prepared the world for him and his labors and of those who immortalized him by their works, are often unknown to the tongues of men. In the words of Dr. Osler, "Such renown as they had, time has blotted out, and on them the iniquity of oblivion has blindly

scattered her poppy." It is the destiny of genius to involve its contemporaries in a partial, or, perchance, total eclipse. This has been true of the heroic figures in the arts of sculpture, painting, poetry, and music, as well as of those which have appeared upon the battle grounds of war and of philosophy. It was thus with Shakespeare. The wonder of a world is still upon him and his work, while his literary contemporaries receive but the attention of the student, the bookworm, or the lover of literature. This is inevitable. It is best that it should be so. Yet there is much indeed in the writings of these contemporaries which bears upon our theme. Even a few references will suffice to make this evident.

In an anonymous interlude, The Marriage of Witt and Wisdom, written in 1579, Idlenes, one of the characters representing vice, refers to the physician in no unequivocal terms. Idlenes declares:

"Now am I nue araid like a phesitien.

* * * * * * *

Now shall you heare how findly Master Doctor
Can play the outlandish man.
Ah, by Got, me be the Doctor.
Me am the fine knaue, *I* tell ye,
And have the good medicine for the maiden's belly;
Me have the excellent medicine
For the blaines and the blister.

* * * * * * *

The bee have no so mony herbes
Whereout to suck hony
As I can find shifts whereby to get money."

—*The Marriage of Witt and Wisdom*—Tertia Scena.

These lines were written only about twenty years before Henry V, Much Ado About Nothing, As You Like It, and The Merry Wives of Windsor, with its "Master Caius that calls himself Doctor of physic." The language used by Witt recalls that of John Heywood's "Poticary" rather than that of Shakespeare.

Most of the better-known Elizabethan dramatists had physicians and surgeons among their characters. In Chapman's All Fools, when a surgeon, Francis Pock, is called to care for a wound of the scalp, he gives a very cheering prognosis in the following words:

"I'll make your head sound as a bell: I will bring it to suppuration, and after I will make it coagulate and grow to a perfect cicatrix, and all within these ten days, so you keep a good diet."—*All Fools*, III, 1.

Pock then wisely advises his patient, Dariotto, to come to his house so that the wound may be the better cared for.

Besides Dr. Faustus, who does not concern us, Marlowe introduces an apothecary and a surgeon into the Massacre of Paris. In Marston's drama, The Wonders of Women or the Tragedy of Sophonisba, written in 1606, there is one Gisco, a surgeon. Ford has one *true* physician (Corax) in The Lover's Melancholy, and a *supposed* physician (Richardetto) in another play, the title of which is not quotable. In Massinger's plays the medical profession is especially well represented—in numbers at least. The Duke of Milan contains *two doctors;* the Parliament of Love has a *court physician;* the Emperor of the East, a *surgeon* and an *empiric;* A Very Woman, one *physician,* two *surgeons,* and an *apothecary;* and the Bashful Lover, a *doctor.* In the works of Beaumont and Fletcher we have only a surgeon in The Chances, written by Fletcher, in 1617; but in Middleton's plays we meet quite an array of physicians, surgeons, and apothecaries. A Fair Quarrel contains a physician and a surgeon; The Family of Love has "Glister, a doctor of physic" and "Purge, a jealous apothecary"; The Changeling gives us "Alibius, a doctor who undertakes the cures of fools and madmen"; and finally in the Inner-Temple Masque there is Doctor Almanac. It is evident that there is no dearth of characters representing the medical profession in the plays of these contemporaries of Shakespeare. As to how well these physicians and surgeons represent, or misrepresent, their profession we cannot stop to consider. For, although interesting historically, as well as in connection with our theme, these delineations lack that greater claim which everything Shakespearean has upon us. The works of the above authors are not, as a rule, upon our shelves. Those of Shakespeare, on the contrary, maintain their time-honored place with the family Bible.

It is evident that as far as the number of the medical characters is concerned the plays of Shakespeare can have no claims above those of Massinger or Middleton. In Shakespeare there are seven physicians, but no surgeons or apothecaries. The last two professions are called into requisition only when the exigencies of the plays require it or they are retained from historical sources. Three of the seven physicians in Shakespeare's plays—the two doctors in Macbeth and the physician in Lear—remain anonymous. Those named are Cerimon in Pericles, Cornelius in Cymbeline, Caius in the Merry Wives of Windsor, and Butts in Henry VIII. The last four, and the physician in Lear, have each in turn suggested an historical personage *to someone.* The two doctors in Macbeth alone have withstood all speculation. Although Helena, in All's Well That Ends Well, is sometimes spoken of as a "woman doctor," and will be referred to again, she herself lays no claim to this title. She is, in the main, the prototype of Boccacio's Giglietta, and not a creation of Shakespeare. It is true, Lafeu announces her as a "medicine," but when she is presented to the king he declares:

. . . . . "I say we must not
So stain our judgment, or corrupt our hope
To prostitute our past cure malady
To empirics."

—*All's Well That Ends Well*, II, 1, 122.

The words of the king quite correctly reflect the attitude of the Royal College of Physicians towards female practitioners. Queen Elizabeth's request, for example, made through her prime minister Walsingham, to let one Margaret Kennix, a poor woman, "to quietly practice and minister to the curing of diseases and wounds by means of certain simples, in the applying whereof it seemeth God hath given her an especial knowledge," was repeatedly denied by the College. Nevertheless, women practiced in Shakespeare's day, and we know that at earlier periods in the history of medicine—the Arabian—

matters pertaining to gynecology and obstetrics were exclusively in their hands.

Friar Laurence, too, must be excluded from the medical profession. He may be regarded as a last survivor of the monk-physician upon whom the Council of Tours set its ban in 1163; or better still, in spite of the slightly changed spelling of his name, as the exact Friar Lawrence found in Bandello's story of the same name. In this story we are told of Friar Lawrence that

> "Not as the most was he, a grosse unlearned foole:
> But doctor of divinitie proceded he in schoole.—l. 567.
>
> * * * * * * * * *
>
> The secretes eke he knew, in natures woorkes that loorke;
> By magiks arte most men suppos'd that he could wonders woorke."—l. 569.

and that

> "The bounty o' the fryer and wisdom hath so wonne
> The townes folks herts, that welnigh all to fryer Lawrence ronne."
>
> —*Tragicall History of Romeus and Iuliet*, l. 575.

The English doctor in Macbeth speaks but four and a half lines. He reveals a belief in witchcraft, so common at that time, and apotheosizes the cure, by the touch, by Edward the Confessor, of that which was the "mere despair of surgery"—the King's Evil. This doctor correctly represents many even famous physicians of the Elizabethan age in his belief that

> ". . . . . there are a crew of wretched souls
> That stay his cure; their malady convinces
> The great assay of art; but at his touch—
> Such sanctity hath heaven given his hand—
> They presently amend."
>
> —*Macbeth*, IV, 3, 141.

This *English* doctor deserves no further comment, although he is repeatedly spoken of as "a noble doctor" by various writers. It is evident that his nobility rests on very meager facts. His colleague, the *Scotch* doctor of the same play, scarcely has a more important role. He is shrewd but tactless and shows a mercenary spirit. In the sleep-walking scene in which he says, "I will set down what comes from her [Lady Macbeth], to satisfy my remembrance the more strongly," he clearly shows his caution. Upon recognizing that "the great perturbation in nature," which afflicts Macbeth, is due to "unnatural deeds" which "breed unnatural troubles," he concludes that such a disease is beyond his practice. Nevertheless, Lady Macbeth's gentlewoman is commanded to

> ". . . . . look after her;
> Remove from her the means of all annoyance,
> And still keep eyes on her."
>
> —*Ibid; vide infra.*

With this and with the words,

> ". . . . . More needs she the divine than the physician."
>
> —*Ibid; vide infra.*

he leaves his patient for the night, without making any attempt to relieve or to end the somnambulism. Surely, he must have known as well as the physician in Lear, that "there is means" to "knit up the ravelled sleave of care." When a little later, in reply to Macbeth's remonstrance:

> "Canst thou not minister to a mind diseased,
> Pluck from the memory a rooted sorrow,
> Rage out the written troubles of the brain,
> And with some sweet oblivious antidote
> Cleanse the stuffed bosom of that perilous stuff
> Which weighs upon the heart?"

he bluntly answers,

> "Therein the patient
> Must minister to himself."
>
> —*Macbeth*, V, 3, 46.

Macbeth justly resents this unfeeling reply with the familiar words,

> "Throw physic to the dogs, I'll none of it."

We all symphatize with Macbeth in his solicitude for his wife and in his reproach of the physician, but we must remember that the circumstances in the play call for retributive justice and that in the requirements of the plot and not in the doctor's ability or character, least of all in the poet's opinion of medicine, lies the explanation of the doctor's reply. The plain professional duties of the physician are sacrificed that the ends of the drama may be fulfilled. After putting on his armor, Macbeth in his despair appeals to the doctor again.

> "If thou couldst, doctor, cast
> The water of my land, find her disease
> And purge it to a sound and pristine health,
> I would applaud thee to the very echo
> That should applaud again."
>
> —*Ibid.*

This cure is impossible, of course, for Scotland's disease is Macbeth himself. Consequently the prudent doctor gives an indifferent answer, but then makes that damaging admission:

> "Were I from Dunsinane away and clear
> Profit again should hardly draw me forth."
>
> —*Macbeth*, V, 3, 61.

Danger to both person and reputation may excuse, to some extent, the doctor's desire to get away from Dunsinane, but certainly nothing can excuse the confession that profit drew him forth in the first instance. Yet he, too, has been judged a "noble doctor." The cupidity shown by him stands in marked contrast to the noble charity of Cerimon or to that of the physician referred to by Bassanio, in the Merchant of Venice, as

> "A civil doctor
> Which did refuse three thousand ducats of me."
>
> —*Merchant of Venice*, V, 1, 210.

While Macbeth's appeals for Lady Macbeth and for "his land" remain unanswered, not so Cordelia's hopeless words respecting her demented, old father. Cordelia, lamenting, asks the physician,

> "What can man's wisdom
> In restoring his bereaved sense?"
>
> —*King Lear*, IV, 4, 8.

and generously pledges,

> "He that helps him take all my outward worth."

Here the physician's reply, in marked contrast to that of the doctor in Macbeth, is given in sympathetic words of hopefulness:

> "There is means, madam;
> Our foster nurse of nature is repose,
> The which he lacks; that to provoke in him,
> Are many simples operative, whose power
> Will close the eye of anguish."
>
> —*King Lear*, IV, 4, 11.

We next meet this physician in Lear's tent in the French Camp. While Lear, "that ruined piece of nature," lies asleep, soft music is playing. As the king stirs, the physician bids Cordelia come nearer and orders the music to sound louder. When finally Lear awakens, Cordelia is wisely asked to speak to him because "'Tis fittest." But the brain-sick old king is confused and so the physician counsels "He's scarce awake, let him alone awhile." Evidently the drugs and rest are supposed to have restored Lear's "bereaved sense," for the physician consolingly says to Cordelia:

> "Be comforted, good madam; the great rage,
> You see, is kill'd in him: and yet it is danger
> To make him even o'er the time he has lost,
> Desire him to go in; trouble him no more,
> Till further settling."
>
> —*King Lear*, IV, 7, 78.

The fact that this physician has music to sound during Lear's awakening is usually given as one of the evidences that Shakespeare was several centuries in advance of the physicians of his own time in his treatment of insanity. I do not wish to stop for a full discussion of this entire subject, but it must be admitted that undue emphasis has been laid upon this fact. In the 16th century music—such as it was— was very popular. Barbers had citterns and virginals in their shops for the amusement of their patrons. Ben Johnson refers to this custom in Every Man in His Humour, when he says, "I can compare him to nothing more happily than the barber's virginal; for every man may play upon him." Lanier gives a similar explanation for the connection between music and dentistry, in the following words:

> "If Shakespeare had wanted a tooth drawn he would have gone to the barber shop to get it done. And he managed to connect this uncomfortable profession with music by the singular custom which prevailed among barber dentists, of tying the teeth which he had drawn to the end of lute strings and hanging them in the window of the shop."
>
> *Shakespeare and His Forerunners*, Vol. II.

That music was used on many occasions we well know. It was used, for example, to stimulate the insane and idiots into all manner of antics, and as an accompaniment in teaching these unfortunates to dance for the amusement of others. Isabella, the wife of Dr. Alibius, who is the caretaker of fools and madmen in Middleton's play—The Changeling, rightfully says of this practice:

> "Alack, alack, it is too full of pity
> To be laughed at!"
>
> —*The Changeling*, 1633, III, 3.

Lollio, the assistant of Dr. Alibius, who conducts this performance, uses a whip in training the insane to keep them at a proper distance. The doctor tells us that he himself must be busy training the "brainsick patients" to perform at a prospective wedding

> ". . . . to make a frightful pleasure.
> To finish as it were, and make the fag
> Of all the revels, the third night from the first."
>
> —*The Changeling*, III, 3.

He then tells Lollio that he will see the final rehearsal and orders the madman hence with:

> "Away, rascal! I'll prepare the music, Lollio."

When finally Isabella, the doctor's wife, and Lollio, the keeper, re-enter with fools and madmen who dance, Dr. Alibius exclaims in glee,

> "Good boy, Lollio!
> 'Tis perfect: well, fit but once these strains,
> We shall have coin and credit for our pains."
>
> —*The Changeling*, IV, 3.

In The Chances, written by Fletcher, we see music used on a still different occasion. When Antonio, a patient, has his wounds dressed by the surgeon, he asks for both instrumental and vocal music besides wine and some other unspeakable thing. The First Gentleman says to Antonio,

> "Leave these things,
> And let him open you."

To which Antonio replies,

> "Do you hear, surgeon,
> Send for the music: let me have some pleasure
> To entertain my friends (besides your salads,
> Your green salves, and your searches) and some wine, too,
> That I may only smell it; or by this light,
> I'll die upon thy hand, and spoil thy custom!"

The First Gentleman commands,

> "Let him have music."
>
> —*The Chances*, III, 2.

After the surgeon's protest against wine is emphasized by the Second Gentleman, he asks Antonio, "Will these things please you?" Antonio replies:

> "Yes: and let them sing
> John Dorrie, ... I'll have John Dorrie!
> For to that warlike tune I will be opened."
>
> —*Ibid.*

That music was supposed to have strange and wonderful powers from time immemorial we all know. The Pied Piper of Hamelin, the story of David and Saul, and the Tale of King Eric of Denmark are well-known examples. Then, of course, there are the *reported* cures by the ancient Greeks and Romans of quartan fevers, the plague, syncope, insanity, epilepsy, deafness, serpent bites, and many other affections, through the use of wind instruments, especially the flute.

The physician in Lear is usually cited as the first reputable one in the plays of Shakespeare. Since King Lear was written in 1607, the year of the marriage of Susannah Shakespeare to Dr. John Hall, it is thought by some that Shakespeare in his portrayal of the physician in Lear meant to pay a tribute to his famous son-in-law. Be that as it may, there is no internal

evidence to that effect, and, of course, it is impossible to disprove the assertion. Furnivall and Lanier, however, think that Cerimon, in Pericles, represents Dr. Hall. If Pericles was written in 1609, as Knight, Meres and others hold, this is possible. If, as seems unlikely, "Shakespeare's own Muse her Pericles first bore," as Dryden says, and as Malone and Chalmer thought, then Cerimon manifestly cannot represent Dr. Hall.

Regarding Cerimon, Lanier very interestingly writes: "It is very delightful to think that this superb portraiture of the ideal doctor which Shakespeare has given us in the figure of Cerimon—a portraiture which ought to be in gold letters and framed and hung up in every medical college in the land—was possibly drawn from an actual personage. We know historically that in the year 1607 Dr. John Hall married Shakespeare's youngest daughter, Susannah. Now, Shakespeare's part of the play of Pericles was probably written just about this time, and it seems very likely that this son-in-law, Dr. John Hall, furnished him with at least some of the features which go to make up the noble Dr. Cerimon." Cerimon, it will be remembered, is the only physician of noble rank in the plays of Shakespeare. He is addressed by Pericles himself as "reverend appearer" and "Lord Cerimon." However, when we first meet him reviving the unfortunate Thaisa, he reminds one somewhat of a magician. His language is strained, and there is an air of mystery about him. Dowden, too, speaks of "Cerimon, who is master of the secrets of nature," liberal in his "learned charity," and "like a first study of Prospero—the great enchanter." Still we must not dismiss him thus. His speech and conduct are truly noble. We recall that when one of the shipwrecked gentlemen, after accosting Cerimon, exclaims:

> "But I much marvel that your lordship having
> Rich tire about you, should at these early hours
> Shake off the golden slumber of repose."
>
> —*Pericles*, III, 2, 21.

Cerimon reveals his nobleness in the reply:

> "I hold it ever that
> Virtue and cunning were endowments greater
> Than nobleness and riches;
> I have ever studied physic,
> Through which secret art—
> By turning o'er authorities—
> I have (together with my practice) made familiar
> To me and my aid, the blessed infusions
> That dwell in vegatives, metals, stones;
> And I can speak of the disturbances
> That nature works and of her cures, which doth give me
> A more content in course of true delight
> Than to be thirsty after tottering honour
> Or tie my treasures up in silken bags
> To please the fool and death."
>
> —*Pericles*, III, 2, 30.

The truth of these words is attested by the Second Gentleman in the words:

> "Your honour has through Ephesus pour'd forth
> Your charity, and hundreds call themselves
> Your creatures, who by you have been restored:
> And not your knowledge, your personal pain, but even
> Your purse, still open, hath built Lord Cerimon
> Such strong renown as time shall never. . . . ."
>
> —*Pericles*, III, 2, 43.

This splendid speech is unfortunately interrupted by the entrance of several servants carrying a box, "caulked and bitumed," which contains the unfortunate Thaisa. After hearing the story of the finding, Cerimon strangely enough, for a physician, at once thinks of gold!

> ". . . . . Whate'er it be
> 'Tis wondrous heavy. Wrench it open straight:
> If the sea's stomach be o'ercharged with gold,
> 'Tis a good constraint of fortune it belches upon us."
>
> —*Pericles*, III, 2, 54.

Why Cerimon, a rich man and a physician, should first think of gold as contained in the box is hard to understand unless it was due to a desire of "preserving life in medicine potabile"—the aurum potabile of the old physicians. This belief in the marvelous powers of soluble gold which, of course, they did not have in Shakespeare's day, is also referred to by the king in All's Well That Ends Well, when he observes:

> "Plutus himself,
> That knows the tinct and multiplying medicine,
> Hath not in nature's mystery more science,
> Than I have in this ring."
>
> —V, 3.

Were Cerimon not a philanthropic gentleman of fortune, Chaucer's lines:

> "And yet he was but easy of dispence,
> He kept that he won in pestilence,
> For gold in physic is a cordial;
> Therefore he loved it in special."

might contain an explanation. The above, however, seems the real reason, although Cerimon's surmise may be only indicative of the spirit of the times—times when treasure-trove and the philosopher's stone were the goal of many common folk, mariners and kings. The New World with its stories of fabulous treasure formed but a part of all this, and these things may explain the physician's remark.

When the box is opened, Thaisa is seen,

> "Shrouded in cloth of state, balmed and entreasured,
> With full bags of spices."

Cerimon now displays his self-possession and ability. Upon descrying life he orders a fire built, sends for his boxes, and commands,

> "The rough and woful music that we have
> Cause it to sound, beseech you
> The viol once more: how thou stirr'st, thou block!
> The music there! I pray you, give her air."

When Thaisa recovers, silence is ordered, and she is carried to a neighboring chamber where

> "The matter must be look'd to,
> For her relapse is mortal. Come, come;
> And Aesculapius guide us."
>
> —*Pericles*, III, 2, 109.

In the closing scene, in which Cerimon returns to Thaisa her jewels, suggests Diana's temple as a refuge, and offers his niece as attendant, he shows himself noble beyond compare. His generous invitation to Pericles to come to his house and "see all" ends the story.

Shakespeare's Cerimon, from Pericles, written in 1609, stands in marked contrast to the physician in Middleton's A Fair Quarrel, written in 1617. The latter wins his patient's confidence by telling her that

> "The patient must ope to the physician
> All her dearest sorrows: art is blinded else,
> And cannot show her mystical effects.
>
> * * * * * *
>
> If you knew well my heart, you would not be
> So circular; the very common name
> Of physician might reprove your niceness;
> We are as secret as your confessors,
> And as firm obliged; 'tis a fine like death
> For us to blab."
>
> —*A Fair Quarrel*, II, 2.

Jane, the patient, then confides in him, only to see him turn a perfidious tempter. When he has threatened his worst regarding her conduct, she defies him in a severe but just denunciation:

> "Away, you are a blackamoor!
> . . . . . Are you the man
> That in your painted outside seemed so white?
> O you're a foul dissembling hypocrite!"
>
> —*A Fair Quarrel*, III, 2.

Cornelius, the physician in Cymbeline, is supposed to be taken from Cornelius, the physician to Charles V. The latter is said to have gained great repute all over Europe by curing the emperor of gout and general debility. When the treacherous queen, in Cymbeline, applies to Cornelius for poison to administer to Imogen, under the plea that she wishes

> ". . . . to try the forces
> Of these compounds on such creatures as
> We count not worth the hanging, but none human."
>
> —*Cymbeline*, I, 5, 18.

Cornelius discourages her by declaring,

> "Your highness
> Shall from this practice make hard your heart,
> Besides, the seeing these effects will be
> Both noisome and infectious."
>
> —*Cymbeline*, I, 5, 24.

But Cornelius, who suspects the designs of the queen, instead of poison

> ". . . . did compound for her
> A certain stuff, which being ta'en would cease
> The present power of life, but in short time
> All affairs of nature should again
> Do their due functions."
>
> —*Cymbeline*, V, 5, 254.

So far, Cornelius shows compassion, prudence, and good judgment. However, like the Scotch doctor in Macbeth, he later receives a just rebuke. When Cymbeline is in his tent surrounded by victorious followers to reward his heroes, Cornelius, accompanied by women, enters the tent. As the king sees them, he surmises:

> "There's business in these faces. Why so sadly
> Greet you our victory?"
>
> —*Cymbeline*, V, 5, 23.

To this Cornelius bluntly answers,

> "Hail, great king!
> To sour your happiness, I must report
> The queen is dead."
>
> —*Cymbeline*, V, 5, 26.

The outraged feeling of the king finds expression in the rebuke:

> "Who worse than a physician
> Would this report become? But I consider
> By medicine life may be prolong'd, yet death
> Will seize the doctor too. How ended she?"
>
> —*Ibid; vide infra.*

Cornelius then tells the iniquitous story in all its tragic details. He spares the king not one iota, but unfeelingly tells of the homicidal designs of the disloyal queen who repented

> "The evils she hatch'd were not effected; so
> Despairing died."
>
> —*Cymbeline*, V, 5, 59.

The physician in Henry VIII, Dr. Butts, has no professional rôle, but simply calls the king to witness the humiliation of the Archbishop, Cranmer, before the council chamber. He is the prototype of the court physician of Henry VIII of the same name. In life, he sympathized with the Archbishop and sympathetically kept him company for a whole hour before the locked doors of the council chamber. It was to him that Dr. Caius, the founder of Caius College and second president of the Royal College of Physicians, dedicated most of his books. He was knighted by Henry VIII as Sir William Butts, and is said to have administered his gout powder—the raspings of a skull unburied—to the Merry Monarch himself. That he was held in high honor is well shown by the fact that his portrait is said to adorn the picture of the delivery of the charter to the surgeons' company in 1572. In the Annals of the Royal College of Physicians, he is recorded thus: "Vir gravis; eximia literarum cognitione, singulari judicio, summa experientia, et prudenti consilio doctor." Hence scant justice is done Dr. Butts in Henry VIII, where he plays a trifling and seemingly ungrateful rôle.

Of the irascible French physician, Dr. Caius, of The Merry Wives of Windsor, Hazlitt in his Character Studies of Shakespeare writes: "The duel scene with Caius gives him [Caius] an opportunity to show his valor and his melancholy in an irresistible manner. In the dialogue which, at the mother's request, he holds with his pupil, William Page, to show his progress in learning, it is hard to say whether the simplicity of the master or of the pupil is the greatest." Caius, as is familiar to everyone, takes no medical rôle. He is simply an indiscreet love-maker, a rival of the imbecile Slender, who uses amusing English, gets into a burlesque duel, is mocked and ridiculed by everyone, and ends by marrying—to quote his words—"un garçon, a boy; un paysan, by gar, a boy; not

Annie Page; by gar, I am cozened." That this "Monsieur Mock-water," as the Host calls him, cannot represent the wealthy and honored founder of Caius College would seem self-evident. Fortunately it is easy to separate the Caius of Shakespeare from the Caius of history. The historical Dr. Caius, a pupil and friend of Vesalius, started dissections of the human body in England, wrote "A Boke or Counseill against the Disease commonly called the Sweate or Sweatyng Sickness," and succeeded Linacre as second president of the Royal College of Physicians. To this office he was re-elected nine times. He died about 28 years before The Merry Wives of Windsor was written. His only epitaph very appropriately and strangely enough for that day reads, "Fui Caius. Vivit post funera virtus." In his Harveian oration Dr. Osler writes of him as follows: "The contemplation of such a career as that of Caius could not but inspire with enthusiasm any young man. No one in the profession in England had before that time reached a position which I may describe as European. An enthusiastic student and a friend of all the great scholars of the day; a learned commentator on the works of the Fathers; the first English student in clinical medicine; a successful teacher and practitioner; a keen naturalist; a liberal patron of learning and letters; a tender and sympathetic friend—Johannes Caius is one of the great figures in our history." Certainly Shakespeare's sense of justice would not have permitted such a travesty of so great a person, and we must conclude that no delineation of this learned man was intended in The Merry Wives of Windsor.

That the French physician, Turquet de la Mayerne, Baron of Aubonne, who came to England in 1607, could not have been meant, seems equally certain. This unfortunate man had been persecuted by his fellow Frenchmen, partly because of his religion, but mainly because he favored some drugs condemned by the Paris College of Physicians. This college in 1603 forbade any of its members to consult with Dr. Mayerne because he espoused the doctrines of Paracelsus. Consequently he left France, came to England in 1607, and gained immediate fame. He compiled the first pharmacopeia published by the Royal College of Physicians, and through his influence at court achieved the separation of apothecaries and grocers. In England he was known as Sir Theodore Mayerne and was court physician to James I and his queen until James's death. After this he became physician to Charles I. Before coming to England he had also been physician to Henry IV of France. He had studied at Heidelberg and Montpelier, and was an authority on distillations. At his death in 1655 he is said to have left a large fortune.

It is not at all unlikely that the introduction of the comical Frenchman, Dr. Caius, into The Merry Wives of Windsor was due to the same impulse which prompted Middleton to introduce into A Fair Quarrel a nurse who betrays her German ancestry by the broken English which she uses. It was the custom to introduce comical characters into plays. They served as mere diversions. Brandes gives the following very satisfactory explanation for the introduction of Dr. Caius into The Merry Wives of Windsor. Brandes observes that "Shakespeare had just been trying his hand in Henry V at writing broken English spoken by a Welshman and by a Frenchman. He knew that at court where people prided themselves on the purest pronunciation of their mother tongue, he could find an audience exceedingly alive to the comic effects thus obtained, and he therefore, while he was in the vein, introduced into this hasty and occasional production two not unkindly caricatures—the Welsh priest, Sir Hugh Evans, in whom he probably immortalized one of his Stratford schoolmasters, and the French Dr. Caius, a thoroughly farcical eccentric who pronounces everything awry."

It was not the character of the Elizabethan age to exalt the surgeon and surgery, yet great advances were made in surgery during those days by men who are famed for all time. In fact, surgeons could not get even simple justice. Their position was not an enviable one. They had to struggle against the prejudices and open opposition of physicians, and were not permitted to free themselves from that incubus—the barber. The fact that most surgeons, no matter how learned, usually wrote in the vernacular drew down upon them the wrath of the physicians. They were accused of giving away the secrets of the profession and were often persecuted maliciously No lines of demarcation between the provinces of the physician and the surgeon existed. Surgeons usually wrote on medical topics also. William Clowes, the surgeon to his majesty, for example, wrote on "lues venera," as did many other surgeons, notably Pare. Woodhall has a chapter on scurvy; and nearly all surgeons—very naturally in those days—wrote on the plague.

In the dramas written by the contemporaries of Shakespeare, mentioned in the beginning of this article, the physician and surgeon are almost equally well represented. In the plays of Shakespeare we find no surgeon. Consequently for an estimate of him we must rely wholly upon the expressions of the various lay characters. Usually the surgeon is sent for in case of dire necessity. This occurs in Romeo and Juliet, Othello, The Merchant of Venice, Twelfth Night, Macbeth, and in Lear. Shylock, too, is advised to

> **"have some surgeon . . . . to stop his [Antonio's] wounds."**
> **—*Merchant of Venice*, IV, 1, 257.**

In Othello, Cassio replies to Iago's exclamation, "What, are you hurt, lieutenant?" with the words, "Ay, past all surgery." Cassio considers himself "past all surgery," not because of a mortal wound but because he has lost his reputation—a malady which defies the surgeon still. But not alone a blemished character was considered beyond the skill of the surgeon, for Lysimachus asks:

> **"Have you that a man may deal withal, and defy surgeons?"**
> **—*Pericles*, IV, 6, 39.**

Lysimachus here refers to luês. A similar instance is found in Macbeth. In this play, Malcolm speaks of

> **"Strangely visited people**
> **All swollen and ulcerous, pitiful to the eye,**
> **The mere despair of surgery."**
> **—*Macbeth*, IV, 3, 152.**

It was this affection, scrofula or the King's Evil, which was thought to yield to the royal touch alone. At that time, how-

ever, a variety of glandular affections, which have since been distinguished as separate diseases, were designated by this name. Even at the present, when we know "the ground whereon these woes do lie; the true grounds of all these piteous woes we cannot without circumstance descry." In those days, on the contrary, these very circumstances were unknown and consequently for this, and for other better reasons, no reflections upon the surgeon or surgery can here be intended.

There are many instances which illustrate well the necessity of reckoning with the character of the speaker and with the dramatic situation. Lear, that "sight most pitiful in the meanest wretch, past speaking in a king!" for example, calls for a surgeon because in his madness he thinks himself "cut to the brain." It would be foolish to conclude that suture of the brain was done in Shakespeare's time, and yet just such conclusions are repeatedly drawn by physicians of to-day. Likewise in Twelfth Night (V, 1, 202) the clown—but what doesn't a clown say!—when Sir Toby asks, "Sot, dids't see Dick Surgeon, sot?" replies, "Oh! he's drunk, Sir Toby, an hour agone; his eyes were set at eight i' the morning." No one should take Sir Toby's "Dick Surgeon" seriously. We all know Sir Toby. Dick Surgeon is polite language for him. It should also be noticed that Sir Toby turns the clown's thoughts to drunkenness by twice calling him "Sot."

It would be incorrect to say that, all in all, the surgeon is depreciatingly spoken of in the plays of Shakespeare. Although he is but incidentally referred to, yet the fact that he is "the brother of grim necessity" shows that his services were considered indispensable. It would be quite as easy to make out a vigorous case against the physician if we chose our references with that end in view. Perhaps if we hear the blame bestowed upon the latter we may the better appreciate the praises.

In sonnet 66, line 19, we meet with the simile: "Folly, doctor-like, controlling skill." The custom of giving hopeful prognoses in cases of extremity is ridiculed in sonnet CXL. Here we are told that

> "Testy sick men when their death be near
> No news but health from their physician hear."

In Lucrece "Advice goes sporting while the patient dies"; while Sempronius, in Timon of Athens, demands:

> "Must I be his last refuge?
> His friends like his physicians
> Thrice give him o'er."
> —*Timon of Athens*, III, 3, 11.

Sempronius here refers to the then still prevalent custom of abandoning all incurables to mountebanks lest failure to cure the patient injure the physician's practice.

Marcius makes a "lip at the physician" and flouts the value of the "most sovereign prescription of Galen." Likewise the wordy Lafeu, the old lord who speaks "special nothings," asks to be "relinquished of the artists." To this Parolles, that "good window of lattice," approvingly adds:

> "So, I say: both of Galen and Paracelsus."
> —*All's Well That Ends Well*, II, 3, 11.

If, as was so often the case, physicians had administered potions to Parolles and Lafeu which they would "tremble to receive" themselves, we can readily forgive the victims for their wishes. Indeed, we ought to forgive them if they had said severer things than these.

Most of us who know Timon know how to judge his warning:

> "Trust not the physician;
> His antidotes are poison and he slays
> More than you rob."
> —*Timon of Athens*, IV, 3, 436.

For the same reason weak King Richard's prayer does not disturb us. It was natural for this "unstaid youth" to pray,

> "Now put it Heaven into his physician's mind
> To help him to his grave immediately."
> —*Richard II*, I, 4, 59.

The sombre picture of the physician presented to us here is offset by many expressions of a wholly different character. Paulina, for example, implores Antigonus to hear her who professes herself

> "Your loyal servant, your physician."
> —*All's Well That Ends Well*, II, 1, 188.

The king, who previously referred to Helena as an empiric, later addresses her, "sweet practiser, thy physic I will try." Even Mrs. Quickly, the hostess of the Garter Inn, in her plain-spoken way, asks:

> "Shall I lose my doctor? No, he gives me the potions and the motions."
> —*Merry Wives of Windsor*, III, 1.

Again, Count Rousillon, the historic Gerhard de Narbonne, Helena's father, is justly referred to as one "whose skill was almost as great as his honesty."

> "Would for the King's sake he were living!
> I think it would be the death of the King's disease!
> —*All's Well That Ends Well*, I, 1, 24.

Strange enough it was he to whom Bertram referred when he scornfully said:

> "A poor physician's daughter my wife? Disdain
> Rather corrupt me ever."

Of course Bertram, the unwilling groom, was as wrong about Helena's father as he was regarding other physicians. Physicians were not poor, but received good fees, carried canes, wore high hats, dressed in velvet and wore specially decorated velvet caps, had valets, and frequently rode on horseback seated in a side-saddle.

It is apparent from the foregoing quotations that the picture of the physician and surgeon in Shakespeare is a composite one. In this it is true to life, for the medical profession in Shakespeare's day was composed of a motley company. Even a slight acquaintance with the medicine of the 16th century and with the physicians contemporary with Shakespeare makes this evident. As a class, physicians were ignorant, superstitious adherents to the past who did not believe their own eyes. Yet there was no dearth of men renowned, for all time, for their professional ability, for their achievements and for their character. Their names are cherished and their labors highly regarded by physicians of to-day. It is these physicians and

surgeons who must be our guides in critically judging the delineations of the doctors in the plays of Shakespeare. As we saw, the physicians in Shakespeare are minor characters who have little opportunity to display professional knowledge, and often form but a small though indispensable part of the dramatic machinery. Their speech, which is not at all characteristic of their profession, is usually determined by the course of events beyond their control. Their character, in several instances, is not above reproach, but we must bear in mind that their sins of omission and commission are frequently the inevitable results of circumstances. Hence we must not judge them apart from their dramatic relations. As we have seen, a few of them may represent personages from actual life. If so, they do it very inadequately, however, for there is no agreement among critics on this matter, save in the very apparent case of Dr. Butts.—There could not well be any disagreement regarding him.

It is idle to theorize, yet it seems that had Avon's bard intended to pay a tribute to the doctors of his time or to those of any other time, he could not have allotted minor rôles to all of them. This seems self-evident, if we recall how many of the physicians of Shakespeare's day struggled so heroically, though of necessity so hopelessly, with the ravages of the sweat and the plague, and how they remained to care for the afflicted and the dead until they themselves fell victims to these scourges. Pepys, in an entry in his diary, made on October 16, 1665, during the great plague of London, refers to these conditions by saying, "And they tell me that, in Westminster, there is never a physician . . . . left, all being dead." From such and from many other facts and from the names of illustrious physicians and surgeons, which are revered to this day, it is plain that there was no dearth of material for the portrayal of the physician in a leading rôle by the world's greatest dramatist. Since his muse knew no bounds there are those who have asked why this was not made. It profits little to speculate. Shakespeare was great and Shakespeare was human. These are two potent reasons why he did some things and left others undone. As for myself, I prefer to take refuge, concerning such matters, in Gothe's wise words of counsel:

> Grau, theurer Freund, ist alle Theorie,
> Und grün des Lebens goldener Baum.
> —*Mephistopheles to the Student, Faust.*

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[1] All references to Shakespearean plays are based on the International Shakespeare, published by the University Society, New York, 1901.

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EPIDEMIC PNEUMONIA.

By MARSHAL FABYAN, M. D.,

Assistant in Pathology, Johns Hopkins University.

From time to time cases of pneumonia have been reported occurring in groups, and not only has this happened too often to be explained by independent infections in every case, but such epidemics are sufficiently rare to make it worth while to report them. These groups may include two or three persons and be associated with some room or house or may be widespread, involving cities and districts.

The more important of these epidemics occurring between 1873 and 1903, have been recorded by Wells. Several plagues of earlier years, said to be a form of pneumonia, are too doubtful to be considered.

The frequent reports of several cases of pneumonia occurring in limited areas and in rapid succession has gradually led to the opinion that pneumonia is far more contagious than is generally supposed. That there are undoubted cases due to direct contagion cannot be questioned .

Osler reports an instance in which ten occupants of one house were attacked. He has seen three members of a family consecutively attacked with a most malignant type of pneumonia.

Müller stated that in the house of a poor village watchman three members of a family of four, and two visitors were affected one after another.

Ritter observed an epidemic of five cases in one house; twelve days later two others working in the house developed pneumonia.

Netter has reported several interesting cases. In one, a son, who was convalescing from acute articular rheumatism, developed pneumonia, from which his father was suffering.

Wilson reported the case of a man who, nineteen days after an attack of pneumonia, had a reinfection of the same lobe (right lower). His brother who nursed him developed pneumonia five days later. A college mate who went into the room of the first man developed the disease two days later. All were cases of typical croupous pneumonia.

Banks, of Chicago, records four consecutive deaths from pneumonia in one family and six among the friends who attended the funerals.

Tucker describes the disease occurring in a colored family in poor sanitary conditions. A sickly, seventeen-year-old daughter was the first to be taken ill; the mother became exhausted nursing her daughter and was the next to contract the disease. The pulmonary area involved was lobar in type; both patients died. Within forty-eight hours, four other members of the family between three and thirteen years of age were taken ill, and the course of the disease in these cases was prolonged.

Other cases are considered to be due to infection from animals, especially parrots. In 1892 a serious and important epidemic of fever associated with pneumonia occurred in Paris which was traced by Nocard to infection with a bacillus which causes the disease *Psittacosis* in parrots. This bacillus belongs to the general class of paracolon, and the disease developed with diarrhœa and headache, simulating typhoid fever, together with more or less pulmonary involvement.

Certain articles from the sick-room seem able to transmit the contagion. Flindt reports a case in which the coverings of a bed in which a pneumonia patient died were carried to a house two miles away and, four weeks later, used on the bed of a child, who promptly developed pneumonia. Another child developed pneumonia three days after his father started to repair a chair which was being used by a patient convalescing from pneumonia.

The spread of pneumonia in institutions and cities is only another form of these epidemics. In hospitals bed to bed infection, or the development of several cases in one ward, has suggested the contagiousness of pneumonia, but with ordinary precautions there seems to be very slight danger. A. H. Smith records one case in which the nurse died of the infection caught from her patient. Girdiner reports a second one. Edsall and Ghriskey record a severe case of pneumonia which ended fatally; the two patients who next occupied the bed had mild attacks; two others in nearby beds developed pneumococcal infections; still another case occurred soon after, perhaps by contagion. Upon thorough disinfection no other cases developed.

Tyson describes an epidemic in which 410 members of a ship's crew were attacked in rapid succession; of 720 men affected, 298 died. On the ship St. Jean d'Acre, of a crew of 815 men, 410 were attacked and those transferred to the Malta hospital communicated the disease to some of the inmates.

Emmerich describes an epidemic in the prison at Amberg in 1880, which lasted six months; of 161 cases, 40 died. The pneumococcus was isolated from the dust under the floor of the infected dormitory; it was not found under the others. Disinfection put an end to the epidemic.

Napier reports a pneumococcal septicæmia which proved very fatal to the men in the Johannesburg ruins. Rhinitis, basal meningitis, pneumonia, and a general septicæmia were present. The pneumoccus was found throughout the tissues post mortem.

Blyth calls attention to the contagiousness of pneumonia in certain English villages in 1875. Butry also describes an epidemic which was spread by friends visiting patients in a hospital. In 1888 Ballard described the Middleboro Epidemic in which 367 cases occurred in a population of 40,000 people. He considerd the pneumonia in these cases as septic in origin, arising from poisonous meats (bacon).

During the building of the new Croton Aqueduct in New York in 1886, Darling treated 150 cases among the poorly housed Italians. Rodman, of Frankfort, Kentucky, reported

in one year 118 cases with twenty-five deaths in a population of 735 persons.

Some consider the cases of pneumonia above described to be of the ordinary croupous type, which have spread under especially favorable conditions, as, for example, lowered vitality of the individual, exposure to storms, cold, privation, exhaustion, and even prolonged sleep (!).

The predisposing influence of other diseases, such as whooping-cough and measles, is well known. An exceptional virulence of the pneumococcus may be an important element. Others have considered epidemic pneumonia as an entity, even going so far as to give it a separate symptomatology and pathology. In favor of the former idea is the fact that in epidemics the individual cases have run a course altogether similar to that of a croupous pneumonia, with the ordinary mortality. In one epidemic the change in virulence was interestingly followed; the attacks began in the summer with a few cases in which the symptoms and course were indefinite, although large numbers of pneumococci were found in the sputa. The symptoms gradually became more definite and the course more severe until, in February, one woman died of definite lobar pneumonia in forty-eight hours.

Aufrecht, in Nothnagel's encyclopedia, treats of epidemic pneumonia under the heading of Atypical Pneumonia, and Wells has called attention to certain individual peculiarities which seem to characterize special epidemics.

On March 24, 1906, a series of five cases of pneumonia occurring in a colored family, entered the Johns Hopkins Hospital, and it was with the hope of determining the ætiological factors in this particular epidemic, that this study was undertaken. The important facts of the cases were as follows:

The family consisted of a father, mother, and eight children, four boys and four girls, between the ages of two and seventeen years. The oldest, a girl, lived out, and seldom visited the family. The rest lived in an old dilapidated wooden house, one and a half stories high, which was located in an outlying district of Baltimore with no buildings in the immediate neighborhood. It stood back from the road, in the gutter of which ran dirty water, and was separated from a brewery by a long gentle slope. An ordinary privy was distant about fifty feet.

The lower floor of the house was divided into an unused room and kitchen on the back, and a cold, cheerless guest room and a living-room on the front. Patients I and V slept in the guest room up to within two weeks of the first illness, when they moved to an unheated garret room containing only a cot. The living-room downstairs was neat in appearance, about 20 x 15 x 8 feet, with two doors and two windows. In one corner the father, mother, patient III, and occasionally patient II slept in a bed. In a cot in another corner patients II and VI usually slept, and another cot was occupied by patients IV and VII. At night the only ventilation was by cracks, and a small stove burnt continually.

Six months before the patients entered the hospital patient VI suffered from a severe attack of whooping-cough, and patient III also developed a mild attack. The other children, except patient V, developed coughs at this time, but never whooped, according to the mother, and continued at school, where there were known to be other cases of whooping-cough.

The children had not recovered their former strength nor were they entirely free from cough when, about March 8, the father stopped work at noon for a few days on account of a cold, hoarseness and "misery" in the stomach. He suffered no pain in the side, dyspnœa or cough; he does not think that he had fever. An examination of his chest two weeks later disclosed nothing abnormal.

Three days later (March 11), patient I felt sickly, but did not go to bed until four days afterwards, complaining of a chill, pain in the stomach, and shortness of breath. Her abdomen gradually became extremely tender. The bowels, which had been regular, were constipated for two days, and later, after taking medicine, the stools became frequent, watery, and of a yellow color.

The day before patient I went to bed (March 14), patient II began to complain of epigastric pain and developed a cough and some pain in the side. She was very sick for two or three days, short of breath and fretful, but was about the house when the others were sent to the hospital, and remained at home. An examination of her lungs showed a resolving pneumonia at the base behind.

Three days later (March 17), patient III complained of pain in the stomach. The next day patient IV had epigastric pain and shortly afterwards a pain in his side. The following day patient V was taken sick with similar symptoms and a chill.

Two days later (March 21), patient VI became ill. A few days later patient VII complained of headache and stomachache, but was about as usual after a few days in the house. A week later his lungs appeared normal. The mother nursed all the children and remained perfectly well. The oldest daughter also helped with the nursing for the three days preceding the admission of the patients to the hospital but remained well. So far as known, there was no sickness in the guano factory where the father worked, or in the neighborhood of the house, which had been very free from disease. There had been no animal pets in the house. No unusual articles of diet had been indulged in, and only city water was drunk. There was no sickness in the family whose washing the mother did. Second-hand blankets were purchased about March first from a dealer, who had procured them in a barrel of unclaimed freight from the railroad. As auctions of this freight only occur every few years, and as the law will not allow a sale until the article has been held at least a year, it does not seem probable that these could have been the source of the infection. Moreover, they were well washed before being used on the children's beds. The sputa is said to have been deposited on rags or in a spittoon.

Patient VI, who suffered most severely with whooping-cough, had only a mild attack of pneumonia and was the last to become affected, although he slept with his sister, who

was the second to develop the disease. A similar instance occurred three days apart. The onset was sudden, usually at night, and associated in two instances with a chill. All had practically the same symptoms: Headache, pain in the epigastrium and chest, with cough. All but one developed diarrhœa.

The following is an abstract of the notes made on admission to the hospital, March 24:

CASE I.—Colored female, 14 years old; occupation, housework. Complaints: Sore throat, pain in the stomach and chest of seven days' duration. There was a distant family history of tuberculosis, but the previous health of the patient had been very good. She had raised considerable frothy and blood-tinged sputa in the present illness.

On physical examination restlessness and dyspnœa were marked. Alæ nasi, active. Respirations, grunting. Patient cried out from pain in the right chest. Sclerotics, jaundiced. No herpes. Tongue, heavily coated. Pulse, regular, 132 per minute, of good size and fair tension (105 mm. of Hg.), not dicrotic.

Thorax.—Well formed. Breathing, costo-abdominal, short, jerky and rapid. Well marked consolidation of the left upper lobe with some involvement of the lower was made out, together with a pleuritic rub over the right lower front. The heart was apparently of normal size, and the sounds clear, the second pulmonic being markedly accentuated. The abdomen was slightly full. The walls were held rigidly, though no muscle spasm could be made out. General abdominal tenderness. No peritoneal friction elicited. Hepatic dulness reached to the costal margin. The rest of the examination was not remarkable. The expectoration was moderate in amount, frothy, mucopurulent and blood-tinged.

The blood examination showed a white count of 29,200 cells and a slight anæmia.

Urine.—Dark, 1015; albumin, trace; sugar, absent; no casts; bile reaction, present; diazo, absent.

The patient became deeply comatose, with the signs of consolidation more distinct at the left base and beginning involvement of the right base. Death occurred quite suddenly three days after admission, probably the eleventh day of the disease.

The blood cultures showed the presence of the pneumococcus.

Diagnosis.—Acute lobar pneumonia. An autopsy was performed by Dr. Cullen.

Anatomical diagnosis.—Acute pseudo-lobar pneumonia; acute fibrino-purulent pleuritis; pericarditis; diaphragmatic pleuritis and general peritonitis; acute splenic tumor; cloudy swelling of the viscera; lymphatic hyperplasia of the ileum; acute mesenteric lymphadenitis.

Lungs.—The left was voluminous, the lower portion being firmly bound to the diaphragm by a thick tenacious exudate. Palpation revealed many firm nodular areas throughout the lung. On section the surface presented a mottling of grayish-red, opaque, slightly elevated areas, alternating with depressed areas of a rather dark red color. This condition was most marked in the upper lobe, but was also present to some extent throughout the lower lobe.

The right lung appeared to be more air-containing than the left. On section it was atelectatic at the apex with slight mottling below, but no areas of nodular thickening were made out. The injection of the bronchi was more marked than on the left.

Microscopically, the lungs presented definite areas of bronchopneumonia. Many alveoli apart from the bronchi showed some breaking down of the walls, but were free from exudate. Others near the bronchi showed typical red hepatization. In other sections the involvement was more general and mixed. Accumulations of leucocytes suggested purulent foci, but there was no definite relation to the bronchial wall. The rest of the necropsy was unimportant for the present consideration.

Cultures of the heart's blood and from the peritoneal cavity showed the presence of the pneumococcus.

CASE II had so far recovered that she was not sent to the hospital. Signs of a resolving pneumonia were present in the back at the time.

CASE III was a boy two years and eight months old. Except for an attack of summer diarrhœa two years before he had been in good health. On March 17 he became fretful and developed a paroxysmal cough and a fever.

On admission to the hospital, four days later, he was found to have rapid grunting respirations and a loose cough. The pulse was 136 to the minute, regular, and of good quality. Except for harsh breathing over the right front and a small area of tubular breathing inside the angle of the right scapula the right lung seemed normal. On the left there were suppressed breath sounds with prolonged expiration at the base of the axilla, with dulness, tubular breathing, and a few medium moist râles below the mid-scapular region. Heart, negative. The white cells numbered 39,000.

Five days after admission the temperature was normal, but rose slightly, and with flatness, diminished breath and voice sounds at the left base, an effusion was suspected. A needle was introduced with negative results. The white count reached 62,500 the following day and then slowly dropped. The patient was discharged two weeks after entrance with some impairment of resonance at the left base.

Diagnosis.—Acute lobar pneumonia. The child was sickly for some weeks after being discharged, but four months later appeared as well as before his illness.

CASE IV was a boy of seven years who complained of pain in the right side of three days' duration. Previously healthy. Physically, no discomfort. Pulse, 116 to the minute, regular, of moderate size and tension, not dicrotic. There was consolidation of the right upper lobe. Heart, negative. Abdomen, slightly full, tympanitic. Hepatic dulness reached one finger's breadth below the costal margin.

The blood examination showed a white count of 27,000 cells and a moderate anæmia.

Urine examination, negative. Diazo reaction, absent.

Four days after admission a crisis occurred and about five days later the lungs were clear. The white cells quickly dropped to 9000.

Diagnosis.—Acute lobar pneumonia.

CASE V was an orphaned cousin who lived with the family, a girl 15 years of age. She complained of pain in the side. The present illness began with a cold which was followed by a chill and cough with bloody expectoration. On admission, two days later, she did not look ill, but the respirations were quickened, and the alæ nasi were active. No herpes. Pulse, 88 to the minute, regular, of fair size and moderate tension. On respiration the right side moved more than the left. There was well marked consolidation of the right upper lobe. The heart was not enlarged and the sounds were clear. Pulmonic second sound accentuated.

The white cells were 19,050. Diazo reaction, absent. The leucocytes quickly dropped, and within a week, although there was dulness over the right apex, the breath sounds were clear. In another week all signs of consolidation had disappeared.

Diagnosis.—Acute lobar pneumonia.

CASE VI was a boy of six years who entered the hospital with the other cases, complaining of pain in the chest and a dry cough of one day's duration. He was restless and dyspnœic, coughing frequently. Herpes, marked. Tongue thickly coated. The pulse was 116 to the minute, regular in force and rhythm, of good

quality. The note over the left upper chest was duller than on the right and the breath sounds were harsh throughout, but nowhere tubular. A few râles were localized near the left nipple. Examination of the heart and abdomen proved negative. The white cells numbered 23,000. Urine examination negative.

Two days later there was a small patch of consolidation in the left lower front, but no further signs developed, and in two weeks the lungs appeared clear.

Diagnosis.—Acute lobar pneumonia.

Reviewing the above cases briefly, it is evident that the etiological factor which caused so many cases is obscure. The somewhat poor sanitary conditions and whooping-cough were assuredly predisposing causes, but the patient who had whooping-cough most severely, developed a very mild type of pneumonia after the others had succumbed.

Is there anything in these cases to suggest a spread from one bed fellow to another? Let us consider the situation.

In one bed slept father, mother, patient III (and sometimes patient II).

In one bed slept patients I and V.

In one bed slept patients II and VI.

In one bed slept patients IV and VII.

The first case of illness was in the father, a respiratory infection of doubtful nature; this was followed in six days by the illness of patient II, an occasional bed fellow, and in nine days by that of patient III, a regular bed fellow.

The second case of illness occurred three days later in the outbreak of patient I which was followed in eight days by the illness of his bed fellow (Case V).

The third case of illness was the outbreak of patient II, six days after the illness of his father, with whom he sometimes slept. This was followed in seven days by the illness of patient VI.

The outbreak of the fourth case of illness (Case III) has already been described as occurring nine days after the illness of his father.

The outbreak of the fifth patient (Case IV) occurred seven days after the illness of patient I, and was followed about a week later by the illness of his bed fellow (Case VII).

These figures are not uninteresting, showing, as they do in the more certain pneumonias, a period between the involvement of the original case and that of the bed fellow of just about a week in each instance. If we are to assume that the contagion spread from bed fellow to bed fellow and that the father's slight infection was the main origin of the epidemic, we may trace further a period of six days on the one hand and nine on the other, between his illness and that of his bed fellows (Case II and Case III), leaving the origin of Case I alone unaccounted for. It might not be going too far to assume that as the father's illness and that of patient I were separated by but three days, the source of infection was the same.

Interesting as these figures are, it must, however, be acknowledged that the weight of evidence appears to be in favor of a shorter incubation period in pneumonia. The blankets might have been a source of infection, but their previous history could not be obtained, while the length of time and thorough washing before using practically rules them out. The symptoms and signs were sufficiently typical to justify us in regarding the cases clinically as ordinary acute pneumonia, though certain features were noted peculiar to other epidemics, i. e., diarrhœa, protracted irregular fever, and jaundice.

The pathological findings in the lungs of the patient who died are interesting, inasmuch as the clinical picture was one of lobar pneumonia, while in fact it was pathologically of a pseudo-lobar type.

Leichtenstern differentiates the lesion in epidemic pneumonia from the croupous type by the fact that there is slow infiltration of part of a lobe which gradually becomes lobar in character. Flaccid heptization and a rapid transition to gray hepatization have also been noted. Aufrecht, in describing the pathology of epidemic pneumonia, states that the condition of the lung is similar to that of the stage of engorgement in the ordinary lobar pneumonia, but that in some cases grayish areas appear in the midst of the red hepatization, occasionally with marked increase in the connective tissue.

Pneumonia in children seldom runs an atypical course, and the symptoms and picture above described are not unusual in lobar pneumonia. Again the pathological picture is not marked enough to justify a separate classification.

The opinions concerning the contagiousness of epidemic pneumonia are interesting:

Aufrecht states that the disease is not inferior to erysipelas and measles in contagiousness.

Sinigar says there is no evidence of direct contagion.

Pratt believes it is contagious to a limited extent.

Preble states that there are absolutely so many instances that if it were contagious, such cases would be of daily occurrence. To speak of contagion in connection with an organism so ubiquitous as the pneumococcus is unnecessary. He advises against isolation but that the excreta be destroyed.

Banks concludes that the communicability of pneumonia is so well established that it warrants all the sanitary restrictions which have been placed on tuberculosis.

Probably the number of epidemics of pneumonia which have been reported has given the condition an undue prominence as a distinct entity which it should not have, for careful analysis shows that the majority of cases represent merely the intensification of some of the variations of ordinary pneumonia. No special ætiological factors have been found to account for this apparent contagiousness in some attacks of pneumonia, nor were any such factors evident in this group of cases.

Summary.

(1) Out of a family of ten members, parents and eight children, one of whom lived away from home, six members developed acute pneumonia within a period of ten days.

(2) A seventh, a child of five years, developed an illness characterized by headache, stomachache, and fever several days after the onset of illness of patient VI. A week later

when seen the patient had recovered and no signs were evident in the lungs.

(3) An eighth, the father, had been ill with a "cold," hoarseness and abdominal pain for three days before the onset of illness in patient I.

(4) Two members of the family only escaped; the mother, and the daughter who lived away from home, but returned to nurse the patients.

(5) Five patients treated in the hospital proved to have uncomplicated acute pneumonia, and a sixth examined at home was found to have resolving pneumonia.

(6) One case in a girl of 14 was fatal. Pneumococci were obtained on culture from the circulating blood during life, and later at autopsy in the heart's blood. Necropsy showed a cropous pneumonia of a pseudo-lobar type.

(7) Study of the conditions under which the patients lived revealed no special ætiological factors beyond crowding and ill ventilation.

(8) It is interesting to note that where two of the patients slept together the second infection followed the first in every instance in from six to nine days.

I have to thank Dr. W. S. Thayer for the privilege of reporting these cases and for various suggestions.

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DISPLACEMENT OF THE HEART BY PLEURAL PRESSURES.

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A discussion of the mechanics of the displacement of the heart by intrapleural pressures is not of immediate practical value, yet a solution of the question must add to the knowledge of intrathoracic mechanics which, subsequently, may be of practical importance.

This article is based on one case of right-sided pleurisy with effusion, one case of double pleural effusion in a new-born, one case of cardiac displacement due to a large peritoneal abscess, and some of the principles developed in a study of pericarditis with effusion (1). The material was fixed in formalin and studied as previously described (1). Again, I am indebted to Dr. C. M. Jackson for the use of the material.

Case I. *Heart displacement.*—Is that of an old colored man, 102 years old, showing a large right pleural effusion. The displacement of the right pericardial wall and the resulting change in the right auricle are well shown. The position of the attachment of the right wall of the pericardium (*P*) to the diaphragm has not been changed. From this point the wall passes upward toward the median line, and reaches the edge of the sternum at the lower border of the third rib. Here, it comes in contact with the right wall of the ascending portion of the arch of the aorta (*C*) which it follows to its attachment to the aorta. The right auricle is compressed to occupy the angle formed by the right wall of the pericardium and diaphragm. The right ventricle is not shown. The left auricle (*G*) is distended and the left ventricle (*H*) is dilated. The remaining structures can easily be seen. (Fig. 1.)

Case II. *Double pleurisy with effusion in a new-born.*—Probably a still-born, history unknown. Weight of child, 3882 grams; length, 54 cm. The child was full term, so the displacement of the organs is due to the mechanical effects of the effusion. Points of interest in this connection only are cited. The central tendon of the diaphragm is about in normal position, it may be slightly displaced (Fig. 2). The two pleural cavities are filled with coagulated effusion, dimly shown in Fig. 2. The lungs are collapsed. The heart is collapsed, completely. Only the left ventricle contained a small amount of clear fluid. Both walls of the pericardium pass from the diaphragm almost perpendicularly upward and are closely placed against the heart. Here the heart has been caught between two pressures, in both pleural cavities, and compressed until no blood could enter the heart, when death occurred. This heart is affected similarly to that described in Case I—of pericarditis with effusion—the same mechanical factors are involved, but differently applied. The heart is not rotated as shown by the relative position of the aortic to the pulmonic valve. The vessels are normal, no malformations.

Case III. *Peritoneal abscess with upward displacement of the heart.*—Case III is that of an adult with a large peritoneal abscess which has pushed the heart directly upward, compressing it against the structures above the pericardium. All of its chambers are smaller than normal and the aorta at its junction with the heart is kinked. In a lateral direction the apex is not displaced. The lower portion of the pericardium is collapsed. No fluid in pericardium. (Figs. 3 and 4.)

The following points are of importance:

1. *The pericardium and diaphragm.* The diaphragm is attached to the base of the xyphoid process, and to the vertebral column through the crura. Its central tendon is supported by the ligamenta suspensoria diaphragmatis, first mentioned by Birand (1862) (cf. Hasse (2)) and later more fully described by Teutleben (1877) (cf. Hasse (2)). This ligament arises from the lower four cervical and upper three dorsal vertebræ, passes downward and forward to end about the large vessels and bronchi in the pericardial wall at the base of the lung. The lower portion of the ligament is formed by connective-tissue fibers of the diaphragm passing upward in the right wall of the pericardium to the base of the lung. Through this ligament the central tendon of the diaphgram and the pericardium are firmly supported from the vertebral column. Luschka says—the pericardial ligaments are strong and will support a number of pounds. The downward motion of the central tendon of the diaphragm is limited, Hasse (2) says, to 0.7 cm.; Grönroos (3), 2½ cm. Its upward motion is not so limited and must depend on the relationship between the abdominal and thoracic pressures. The pulmonary vessels, aorta near its origin, and superior cava must partake of the lateral movement of this ligament and the right wall of the pericardium. Consequently the base of the heart must be displaced an equal distance. The displaced ligament, in the right wall of the pericardium, is in a curved line between the two points of attachment.

For convenience, a right and left wall of the pericardium may be described. The right wall is composed of the ligamenta suspensoria diaphragmatis and the pericardium proper, is shorter than the left wall, and passes almost perpendicularly upward from the diaphragm. It projects only slightly into the right pleural cavity. The parietal pleura is reflected on to the pericardium near the median line in front. The left wall passes from the large vessels around the heart to connect with the diaphragm to the left of the median line. It is therefore longer than the right. The parietal pleura, in front, is reflected on to the pericardium near the median line and is between the anterior thoracic wall and the pericardium for quite a distance; it also passes under and behind the heart, so that a greater portion of the heart is covered by the left wall and a corresponding surface exposed to pressure changes in the left pleural cavity. Granting the two walls are of equal strength, through equal distances the left, being longer, is more easily displaced than the right.

In Cases I and II the central tendon is not materially depressed. This is due to the support of the ligamenta suspensoria diaphragmatis and to the fact that only a small factor of the pleural pressure is exerted in a perpendicular direction against the central tendon. This may be seen in Figs. 1 and 2.

2. *Heart.*—The heart swings free from the large vessels above and from the inferior cava below. The latter is short and firmly attached to the diaphragm, permitting perhaps

less motion than occurs in the large vessels above. The lateral movement of the large vessels with the mediastinal tissues rotates the heart through a small arc of a circle, the center of which is at the juncture of the diaphragm with the inferior cava.

The heart is a hollow, soft-walled organ, the size of which must depend on the actual amount of blood contained therein, on the intracardiac and the intrathoracic pressures. With a free flow of blood to the heart the size of the heart must depend on the relationship between the intracardiac and intrathoracic pressure, if the latter is greater the heart must be compressed, or hypodistended, as compared to a normal distension or dilatation.

The amount of blood in the heart depends on the amount delivered to the right auricle by the systemic veins.

3. *Pleural pressure.*—Aron (4) found the average normal intrapleural pressure in 36 cases to be, in inspiration minus 4.64 mm. HG, expiration minus 3.02. Regarding the changes in this pressure due to effusions, etc., much difference of opinion is expressed. Traube and Garré (cf. Holbauer (5)) say: "In pneumothorax the negative pleural pressure is relieved (or the pulling force is lost) allowing the negative pressure of the sound side to pull the organs to that side." More recently Hofbauer (5) has advocated the same idea. But if the negative pressure on the affected side is relieved the pressure of that side must be increased, so must help to push the organs to the sound side. Bard (6) says: "A normal or positive pressure is rapidly fatal and that the effect of the fluid is independent of the pressure." On the other hand most writers think a positive pressure is developed by effusions and pneumothorax, etc. Emerson (7) found in pneumothorax a pressure of 9 mm. Pitres (8) found in effusions of 1000 cc. a pressure of 8 to 20 mm. HG; 2000 cc., 20 to 44 mm. It may safely be said that in pleural effusions the intrapleural pressure is above the normal.

4. *Venous and arterial pressures.*—Recently, Gerhardt (9) has measured the venous and arterial pressure after injecting varying quantities of fluid into the pleural cavity. His results are tabulated on page 207; and show that as the quantity of fluid in the pleural cavity increases the intrapleural pressure increases; as the pleural pressure increases the pressure in the jugular vein increases and is always above that in the pleural cavity; for a time the arterial pressure is not changed, but as the pleural pressure increases the arterial pressure decreases. Under certain conditions the arterial pressure may be increased.

In Fig. 5 *A* and *B* represent two movable walls, separated by a flexible bag *C* to which is attached a tube *D*, this bag is filled with fluid.

If *A* is pushed toward *B*, *C* is collapsed, when there is no pressure in *C*. But if the pressure in *C* is greater than the pressure necessary to move *B*, *C* fails to collapse, and the pressure exerted by the movement of *A* is transferred through *C* to *B* which must be moved a distance equal to the distance *A* moves. If there is a certain amount of pressure in *C*, say less than is necessary to move *B* and the tube *D* is closed, the movement of *A* toward *B* will compress *C* until the pressure in *C* is equal to that necessary to move *B*, then *B* is displaced, preventing a further rise of pressure in *C*. Consequently the displacement of *B* by the movement of *A* depends on the relationship of the pressure in *C* to the resistance offered by *B*; if pressure in *C* is less than the resistance of *B*, *B* will not be displaced, if equal to or greater, *B* will be displaced until the increased tension of *B* equals the pressure in *C*. Beyond this point *C* will be collapsed by further movement of *A* unless the pressure in *C* is further increased. Or the greater the displacement of *B* the greater must be the pressure in *C*. The pressure in *C* must have a limit when further movement of *A* will collapse *C* and not cause further displacement of *B*. Or as *A* moves toward *B*, *C* must compensate the pressure exerted by *A* to keep from collapse, or as *A* moves toward *B* the pressure in *C* must increase and further displace *B*.

Transfer Fig. 5 to the thorax and let *A* represent the left wall of the pericardium; *B*, right wall; *C*, the heart; *D*, the venæ cavæ. The flexible, elastic pericardial wall surrounds the heart. A pressure exerted against the left wall must press it against the heart and transfer the pressure directly to the heart. The heart is displaced until it encounters the resistance of the right wall. As soon as this resistance is developed the normal relationship of the auricular and pleural pressure are disturbed (pleural increased). Consequently the heart is compressed until the pressures are relatively normal after which the heart maintains its size and transmits the entire pleural pressure to the right wall of the pericardium. While this readjustment of auricular pressure is taking place, a portion of the pleural pressure is used to force blood from the heart backward into the veins, or what amounts to the same thing, prevents blood from flowing to the heart. Or a venous congestion and rise of pressure develops to compensate the heart against the pleural pressure and to prevent a collapse of the heart between the two pericardial walls, as shown in Case II. The right wall of the pericardium is displaced by the pleural pressure exerted through the heart.

So long as venous compensation continues the heart maintains its normal size. Room for the heart is made by the displacement of the opposite pericardial wall. But a time comes when to further displace the pericardial wall requires more pressure than can be delivered to the heart. From this time the heart begins to diminish in size, due to the venous pressure failing to compensate. The heart is hypodistended, and displaced in the pericardium which is collapsed as shown in Case III.

In addition to the above general consideration, differences in the effect of pleural pressures in the two sides may be noted.

Effusion on the Right Side.—Displacement of the heart to the left on change of position may be as much as 6 cm., more commonly 4 cm., without undue stretching of the left wall of the pericardium.

Two simultaneous effects are produced by the effusion: First, on the right side the venæ cavæ are directly exposed to the pleural pressure which must compress them, causing a congestion and rise in pressure. This rise in pressure compen-

sates the pleural pressure and delivers blood to the right auricle under an increased pressure and in larger than normal quantities. Second, the right wall of the pericardium is displaced to the left pushing the heart before it, to take up the 3 or 4 cm. of possible (passive) displacement of the heart. Beyond this point the left wall resists further displacement of the heart and thereby changes the normal relationship of the auricular and pleural pressure. These two factors produce an increased amount of blood delivered to the heart under an increased pressure without a corresponding increase in the auricular pressure. This results in (1) an increased rate of pulsation, (2) increased quantity of blood in the heart or a dilatation, and (3) an increased output of blood which results in an increased arterial tension. Hensen (10) records a relatively high tension in a right-sided pleurisy.

The displacement to the left must depend on the degree of pressure in the right pleural cavity, the resistance offered by the left wall, and the degree of distension of the heart. If the left wall is too weak to resist the pleural pressure, the right wall must support all of it. In this event changes in the auricular pressure are caused, mainly, by the changes in the venous circulation. In all cases the right wall supports a portion of the pressure. So long as venous compensation is maintained the heart must remain normal in size or slightly dilated, but when the pleural pressure begins to diminish the flow of blood to the heart, the heart must become smaller with a proportionally diminished displacement, and a decrease in arterial pressure.

Left-sided Pleurisy.—The left pleural cavity passes in front of, under, and behind the heart, consequently the pleural pressure is directed against a large portion of the surface of the heart. The left auricle is directly exposed to the pleural pressure, consequently must be compressed until the auricular pressure regains its normal relationship to the pleural. This change in the auricular pressure is compensated by the right ventricle. While the above has been taking place the heart as a whole has been pushed to the right against the right wall of the pericardium, compressing the right auricle and obstructing the venous circulation as described.

Two mechanisms for compensating the pleural pressure are necessary, the right ventricle for the left auricle, and the venous congestion for the right auricle. Either or both of these mechanisms may fail. If the venous compensation is competent and the right ventricle fails, the right ventricle must dilate to receive the blood forced into it by the auricle and the left heart must be proportionally smaller. If the venous compensation fails sufficient blood is not delivered to the heart, which becomes smaller or is collapsed as shown in Case II. If both mechanisms remain competent, the pleural pressure increases and further displaces the right wall until it requires more pressure to displace the wall than it does to compress the heart. Now the heart becomes smaller, as shown in Cases II and III, the apex approaches the base and also the sternum. The degree of displacement of the apex is determined by elasticity of the right wall of the pericardium and the degree of distension of the heart. The displacement of the apex from the left side may, in part, be due to the fluid coming in between the anterior wall and the pericardium. As the apex moves to the right the auricles are further compressed to permit the heart to swing about the large vessels (as a door on its hinges). The aorta and pulmonic arteries are carried slightly to the right, causing a slight rotation of the heart from left to right, due to fixation of the heart by the inferior cava. When the pressure within the left ventricle and aorta become less than the resistance of the mediastinal tissues the aorta must be kinked. This point is shown in Case III, but has not been pictured.

The reputed downward displacement of the diaphragm by the apex in its movement to the right can be determined by direct observation only. Considering all the factors involved, it would appear impossible. The power of the heart to displace the diaphragm is equal to the intracardiac pressure. This pressure is exerted near the attachment of the diaphragm to the anterior thoracic wall. Here, it seems, more pressure would be required to displace the diaphragm than nearer the center, where in two cases it is displaced only slightly, if at all.

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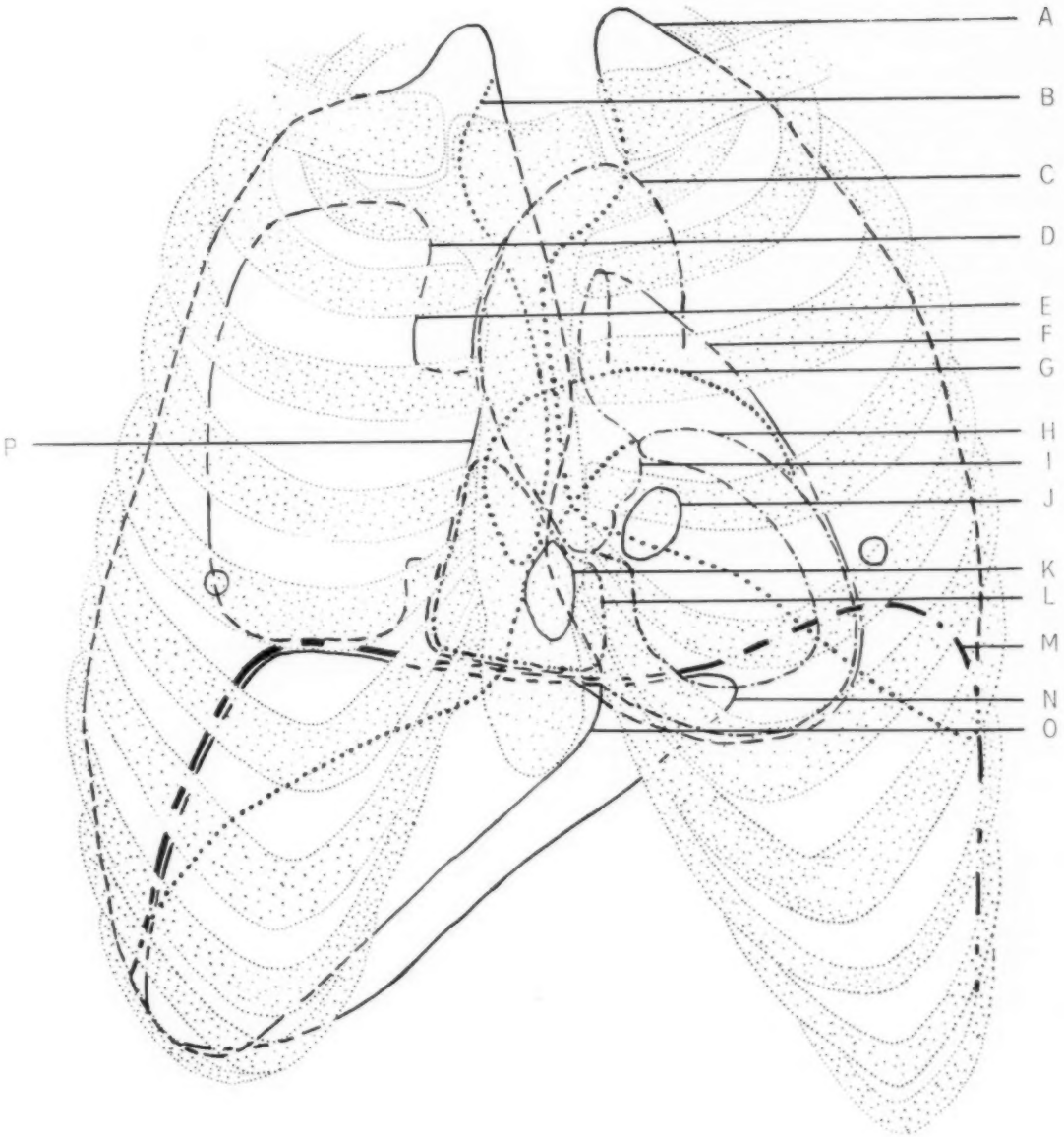

FIG. 1.—*A*, boundary of left pleural cavity; in the front portion of the body it is shown in large dots; *B*, anterior border of right pleural cavity, also shown in large dots; *C*, arch of aorta; *D*, right lung collapsed; *F*, pericardium; *G*, left auricle; *H*, left ventricle; *I*, aortic valve; *J*, mitral opening; *K*, tricuspid opening; *L*, right auricle; *M*, diaphragm; *N*, liver; *O*, posterior boundary of right pleural cavity; *P*, right wall of pericardium.

FIG. 2.—New-born. Double pleurisy with effusion, ascites. *A*, the left, *H*, the right wall of the pericardium; *B*, collapsed heart; *C*, remains of left lung; *D*, thoracic wall; *E*, that portion of the thoracic wall to which the diaphragm is attached; *F*, liver; *G*, middle lobe of the right lung.

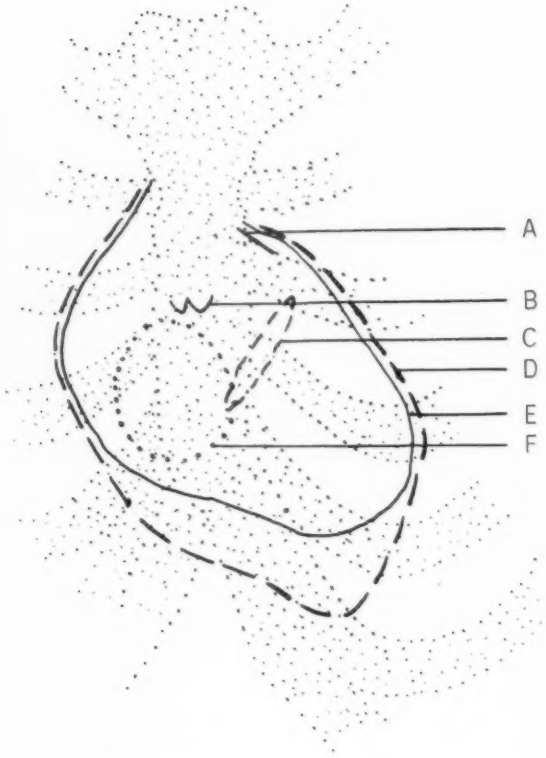

FIG. 3.—Front projection, showing the outline of the heart and pericardium. *A*, pulmonic valve; *B*, aortic valve; *C*, mitral; *F*, tricuspid valve; *D*, pericardium; *E*, heart.

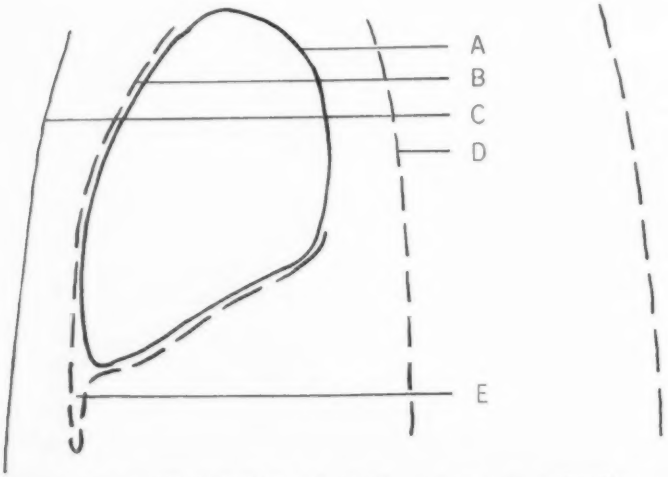

FIG. 4.—Sagittal section of Case III. *A*, heart; *B*, pericardium; *C*, anterior thoracic wall; *D*, anterior border of vertebral column; *E*, collapsed portion of the pericardium.

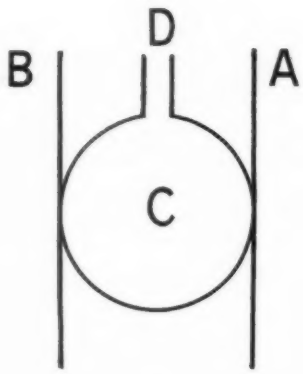

FIG. 5.

COMPENSATORY VENOUS CONGESTION.

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In discussing compensation of tricuspid insufficiency, Franke (1), after giving a brief historical statement, reviews the work of Stadler, and calls attention to the rôle of congestion of the venæ cavæ and its branches, especially those of the liver. In one of his cases, he noted the absence of the præsystolic venous pulsation due to the systole of the auricle, from which he concludes that in this case the auricle was passive, so took no part in compensation. Three factors in tricuspid compensation are given: (a) Activity of right ventricle; (b) elasticity and passive resistance of the venous system and right auricle, and (c) the activity of the peripheral circulation, etc., especially the liver. In conclusion Franke says: "When the compensation of the mitral and tricuspid insufficiency are compared, it is seen that the liver and peripheral vessels play the same rôle in compensation of the tricuspid valve as the right ventricle plays in compensating mitral insufficiency."

In experimental tricuspid insufficiency in dogs, Stadler (2) found hypertrophy and dilatation of the right ventricle and auricle, normal or atrophied left ventricle, general venous congestion, and in some cases subcutaneous œdema.

Salaman (3) found that a normal liver under high pressure holds its volume of water, most of which is expelled when the pressure is removed. He likens the liver to a sponge. Continued pressure destroys this elasticity and interferes with the degree of activity of the liver in compensating heart lesions in the order of the pathological changes produced, as follows:

1. Engorged liver—perfectly compensated heart lesion.

2. Nutmeg liver—prolonged back pressure—with some fatty changes and cirrhosis in the center of the lobule.

3. Cirrhotic nutmeg liver—portal, hepatic, and central fibrosis are well marked—liver is small, hard and due to long standing back pressure.

In the above discussions the activity of the heart complicates, by introducing too many factors, the general question of the rôle of venous system and the liver as factors in compensating the tricuspid valve. Consequently, if the heart can be eliminated the rôle of venous congestion can be more easily discussed, and its importance more clearly shown. In pericarditis with effusion the heart can be eliminated, for the pressure of the pericardial fluid acts on that portion of the venæ cavæ within the pericardium, consequently affects the venous circulation before the blood reaches the heart and before the heart can possibly have any effect on the venous congestion. Two cases of pericarditis have been studied. In one that portion of the venæ cavæ within the pericardium was collapsed; in the second, dilated, as illustrated (4).

This observation shows that when the pericardial pressure is sufficiently high the venæ cavæ within the sac are collapsed and when low the veins are open. Some pressure must keep them open. The only pressure at hand is the venous pressure due to the congestion. The venous congestion then must compensate the pressure of the pericardial fluid on the venæ cavæ within the pericardium. This compensation must continue, unaided, until the limit of venous pressure is reached, after which an additional rise in pericardial pressure must collapse the veins within the pericardium, thereby preventing the flow of blood to the heart. As the maximum venous pressure can be produced in pericarditis with effusion, no greater pressure can be caused by tricuspid lesions. As the venous pressure, unaided, can compensate pericardial pressures, it must follow that to the same degree it can compensate tricuspid lesions. Here the activity of the right auricle must be taken into account. But, if inactive, as suggested by Franke, the auricle is dilated and simply adds that much blood to the venous congestion.

The venous congestion, including the liver and right auricle, in tricuspid insufficiency must be likened to the left auricle, pulmonic congestion and right ventricle in mitral insufficiency. While the right ventricle in tricuspid lesions plays the same rôle as the left ventricle, in mitral lesions.

On account of the importance of venous congestion in compensating pericardial (5) and pleural (6) effusions, pneumothorax and tricuspid lesions, the name "compensatory venous congestion" is proposed as a term which more accurately describes the function of the congestion than the term "chronic passive congestion" which was adapted at a time when the rôle of the congestion had, probably, not been fully considered.

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ECLAMPSIA WITHOUT CONVULSIONS.

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The disease which is now universally designated as eclampsia was described by the earliest medical authors, but its present apellation dates from comparatively modern times. The word itself derived from the Greek ἐκ, forth, and λαμπειν, to shine, was used in classical literature to describe a flash of lightning or the sudden beaming of the sun through the clouds. When first introduced into medical terminology the word eclampsia was not used in connection with the disease with which it is now associated, but was employed to denote a sudden rise in temperature. It was used in this sense by Hippocrates and throughout the Middle Ages.

According to Knapp and Kossman, the first instance in which the term was applied to convulsive seizures occurs in The Nosology of Boissier von Sauvage, published in 1760. Under the caption Eclampsia, the latter classified all non-periodic fits other than epileptic, but made a separate group of the convulsions occuring during pregnancy, which were designated as "Eclampsia parturientium." Gehler, a professor of physiology in Leipzig, adopted this term and made use of it in theses written in 1776 and 1777. For some time the use of the term remained purely local, but it gradually gained favor, so that fifty years later its use had become current throughout the continent.

The convulsive attacks, which finally gave the disease its enduring name, have always been its most prominent clinical feature, and this they remain. However, it is of prime importance to recognize that they are not the disease itself, but merely constitute one of its symptoms. Disregard of this fact leads to the diagnosis of eclampsia in all conditions in which convulsions occur during pregnancy. Should the pathologist accept without question such clinical diagnoses, his findings at autopsy would vary so greatly that it would be impossible to regard any lesion as specific; whereas, in truth, the pathological anatomy of eclampsia is most characteristic and offers the only means by which an unimpeachable diagnosis can be made.

Since the appearance of Schmorl's monograph in 1893, it has been generally conceded that the typical anatomical findings in eclampsia consist of degenerative changes in the kidney and myocardium, hæmorrhages into the brain and focal necroses in the liver. The last constitute the most important eclamptic lesion and would seem to be areas of infarction dependent upon thrombosis of the smaller portal vessels. The areas of necrosis may be either hæmorrhagic or anæmic in character, but always maintain a regular topographical disposition, appearing first in the portal spaces and invading the peripheral zone of the lobule. Schmorl's observations have been abundantly substantiated by Jürgens, Klebs, Pilliet, Bouffe de Saint Blaise, Prutz, Lubarsch, Pels Leusden, Bar, Williams, Jung, Chiari, Sandberg, and Lindfors and many others.

The changes in the liver are most characteristic, and Schmorl regards them as absolutely pathognomonic, having noted them in 70 out of 72 cases, and in the two negative instances there was total thrombosis of the portal vein. In a recent study of the liver in 500 autopsies at the Johns Hopkins Hospital, Opie noted such lesions only in eclampsia; while Williams has met with them so regularly at autopsy upon eclamptics that he considers that their presence justifies the diagnosis of the disease, even in the absence of a clinical history.

Unfortunately, we are not in possession of any clinical phenomenon in eclampsia which may be fairly said to point to the occurrence of this specific change in the liver. All the signs and symptoms, as we know them now, may occur in a number of other conditions. Thus, Lloyd has lately recorded an instance of uræmia during pregnancy in which the clinical picture was identical with that obtaining in typical eclampsia, yet the autopsy revealed a profound acute necrosis of both kidneys without any change in the other viscera. Likewise, acute yellow atrophy of the liver may be indistinguishable from eclampsia at the bedside, while occasionally it may be impossible to make a differential diagnosis between it and epilepsy or even hysteria.

Again the obstetrician should bear in mind the fact that the toxic action of certain drugs may simulate eclampsia, particularly as women who are illegitimately pregnant may take poison with suicidal intent. Knapp has met with cases of strychnine poisoning and Schild with intoxication from nitro-benzol which could not be distinguished from eclampsia by the symptomatology. Lead, phosphorus, carbolic acid, corrosive sublimate and mushroom poisoning also give rise to toxic manifestations which may be characterized by convulsions and coma.

The difficulty in making a positive clinical diagnosis of eclampsia is still further increased by the fact that the disease sometimes appears in an atypical form. Thus, the customary convulsive attacks, the very symptom which has given the disease its name, may be absent throughout its course. Two such cases have come under observation in the Obstetrical Department of the Johns Hopkins Hospital, and I am indebted to Dr. Williams for the opportunity of making this report. The diagnosis in each instance was obscure, until the characteristic hepatic changes were demonstrated at autopsy; and in view of their presence, it was evident that both cases were examples of the somewhat paradoxical condition—eclampsia without convulsions.

CASE I.—Obstetrical No. 909. K. B., negro, IV p., aged 27.

The patient applied for registration in the out-patient department April 25, 1901. She stated that her four previous pregnancies had been normal. Her labors and convalescence had always been free from any complication. During the present pregnancy she has been quite well.

May 2. She visited the dispensary to bring a specimen of urine previously requested. This showed 0.05 gm. of albumin to the liter, but contained no casts. There were no subjective symptoms.

June 4. She complained of swelling of the feet and legs, but had no headache, visual disturbance or other subjective symptoms. The urine presented a large amount of albumin without casts. She was advised to enter the hospital, but declined.

June 12. Delivered by the Out-patient Service at 10.30 p. m., after a normal labor of 18 hours. Child was a male, 50 cm. in length, and weighed 7¼ pounds. The mother's condition was good when left at midnight.

June 13. When the nurse called at 9 a. m. to pay her daily visit, she found the woman in a semi-conscious condition, with a normal temperature and a pulse of 46 to the minute. The family stated that no convulsion had occurred, and attached little importance to the drowsy condition of the patient, but after considerable delay, reluctantly consented to have her removed to the hospital.

Examination on admission to the hospital two hours later. The patient is a stout colored woman presenting marked œdema, especially of face, hands, and feet. She is semi-conscious and arouses slightly when questioned, yet cannot be made to answer. The breathing is stertorous. Pupils contracted. Temperature, 98.4°. Pulse, 64. Heart sounds clear. There are definite signs of fluid in both pleural cavities and in the abdomen. The urine, 520 cc. by catheter, is neutral in reaction and has a specific gravity of 1010. The albuminous precipitation is heavy. On microscopical examination, casts of varied type and red blood cells are found. Soon after entering the hospital 400 cc. of blood were taken from one of the veins of the arm and an equal amount of normal saline solution transfused. Following this a sweat bath was given. The patient did not respond; gradually became profoundly comatose and died, without having had a convulsion, at 4.45 p. m. the same day.

Autopsy (Path. No. 1749).—Permission was obtained for a post-mortem examination with great difficulty, so that it could not be made until the day after death. As an agonal infection with the gas bacillus had occurred, all the tissues and organs of the body presented an emphysematous appearance, which in a measure marred the anatomical findings. The autopsy was performed by Dr. W. G. MacCallum, who kindly placed the following notes at my disposal.

Anatomical diagnosis.—Puerperal uterus. Hydronephrosis and hydro-ureter. Chronic nephritis with hæmorrhage. Hæmorrhages into liver. Acute spleen tumor. Œdema of lungs. Distension of veins with gas. Emphysematous organs. Interstitial emphysema of lungs.

Body of a stoutly built negro woman, 165 cm. long. The abdomen is distended, and on being opened is found to contain blood-stained fluid. The peritoneal surfaces are smooth everywhere.

Both pleural cavities as well as the pericardial cavity contain bloody fluid.

Heart weighs 340 gm. Endocardium smooth. Valves are normal.

Both lungs present a smooth surface. No areas of consolidation are found.

Spleen weighs 230 gm. No macroscopic lesion noted.

Liver measures 25 x 18 x 9½ cm. Over almost the whole surface of the right lobe an extensive subserous hæmorrhage is seen. Smaller hæmorrhages are scattered over the remaining surface of the organ. On section, the lobules are extremely pale and opaque. The greater part of the right lobe shows conglomerate hæmorrhages throughout its substance. These obscure the lobulations. Small gray points can be seen among the fresh hæmorrhages and here the consistence is much firmer. These are evidently areas of liver tissue. Other hæmorrhages occur throughout the liver.

Kidneys. Left: Capsule strips off easily. On section, one notes hæmorrhages into the substance of the organ. The pelvis of the kidney as well as the ureter is distended. Right: Somewhat larger than left, but presents the same general appearance. The ureter is slightly distended, but much less so than on left side. No obstruction, other than the uterus, can be found blocking the ureters.

Stomach is distended with gas, but otherwise is normal.

Pancreas is emphysematous, but otherwise normal.

Brain: On opening the skull, no puerperal osteophytes are found.

The cortex is normal in appearance, except for an atrophic area behind the fissure of Rolando on the left side. (No notes were made as to the quantity of cerebro-spinal fluid. The condition of the brain substance or the condition of the lateral ventricles.)

The uterus rises 16 cm. above symphysis. Its surface is smooth and glistening.

Microscopical examination.—Liver: A large portion of the organ is made up of necrotic tissue in which the nuclei are indistinct or totally missing. The cell protoplasm stains deeply with eosin. Between the dead cells there is an extensive infiltration with blood.

Other sections show the liver cells in a better state of preservation as a whole, but numerous foci of degeneration and necrosis are noted. The fresher ones are accurately confined to the portal spaces with the bile duct approximately in their centers, while the adjacent blood vessels are thrombosed. A few of these areas are anæmic, but for the most part they are infiltrated by hæmorrhage.

Larger areas of necrosis predominate, involving all or parts of several lobules. They appear to have resulted from the fusion of smaller areas of infarction, or from a secondary extension from a single portal space. Practically everywhere the liver is infiltrated with blood.

Kidney: A general increase in connective tissue is apparent throughout the section.

The cells of the straight and particularly of the convoluted tubules are the seat of marked degeneration. The cell nuclei having disappeared, the cytoplasm is converted into hyaline material. Some of the glomeruli are contracted, and lie in what are apparently retention cysts. In other places they are swollen and completely fill the surrounding capsule.

Spleen: Pulp is engorged with blood. The vessels in the center of the Malpighian corpuscles contain thrombi and are surrounded by masses of hyaline material, frequently occupying half of the tuft. Under the high power these are seen to be made up of areas of agglutinated red blood corpuscles.

Heart: The myocardium presents a mild parenchymatous degeneration.

Lung: Blood vessels distended. Alveoli show œdematous changes, but do not contain any inflammatory exudate.

CASE II.—Obstetric No. 1722, L. C., white, primigravida, aged 33.

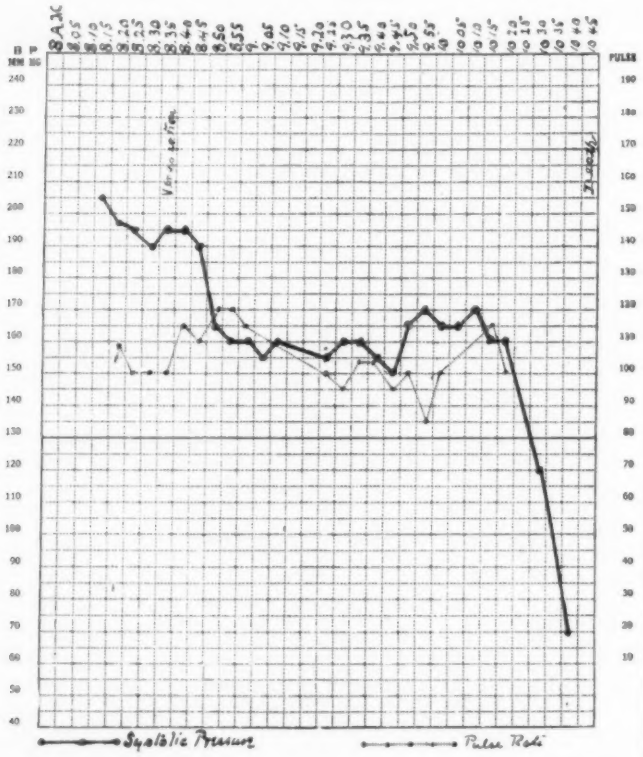
The history prior to admission was obtained from the patient's mother, an intelligent woman, whose statements gave the impression of accuracy and trustworthiness.

The patient has always been rather delicate. As a child she had diphtheritic croup and measles. Both these attacked her with more than ordinary severity. No other serious illness can be remembered. She frequently had "spells," which were usually associated with the mentsrual period, and in which she suffered from nausea, vomiting, headache, swelling of the feet and legs, and puffiness about the face.

The last menstruation occurred in August, 1903. Since then she has never felt well and has complained of a good deal of headache and difficulty in reading, on account of "seeing double." She is habitually constipated. Her whole body has been swollen for some weeks. The patient has never mentioned passing less urine than usual, nor any other peculiarity of micturition. A decided change for the worse in her condition occurred about the middle of February, when she "caught cold." Since then the headache has been more severe and the swelling has increased.

Two weeks ago the patient was threatened with premature labor, and had considrable bleeding, which ceased after a few days. She did not have abdominal pain on this occasion, or at any other time. The day before admission she was more uncomfortable than usual, but was not sick enough to go to bed. After retiring at the customary hour, she awakened her mother about 3 a. m., when she complained of "sick stomach" and was violently nauseated for half an hour, but did not vomit. Immediately afterwards she fell into a stupor and did not regain consciousness. The patient's husband, mother and father, who came to the hospital with her, all agreed in the statement that she had not had a convulsion of any kind.

Examination on admission.—March 12, 1904, 7.15 a. m. Patient is a stout woman, weighing about 200 pounds. She is in profound coma and all attempts to arouse her fail to elicit the slightest response. Face is cyanotic and swollen. Pupils are contracted. Conjunctival reflex is absent. Lips are quite blue and do not present any abrasion. Tongue is uninjured. There is a sweetish odor to the breath. Lungs are negative on percussion and auscultation. Respirations 20 to minute, are alternately shallow and deep, closely resembling the Cheyne-Stokes' type. Heart sounds are clear at apex and base. Pulse is full, of high tension, regular in force and rhythm. Systematic observations as to its rate and the systolic blood pressure (Riva Rocci apparatus) are given in the accompanying chart.



Abdomen is distended by the pregnant uterus which rises three fingers breadth above the umbilicus. There is dullness in both flanks. Feet and legs are markedly swollen and readily pit on slight pressure. Temperature by rectum is 99.2°. Vaginal touch shows the cervix long and snout-like. The external os is intact. The cervical canal is approximately 3 cm. in length.

Urinalysis.—Two hundred cubic centimeters of amber colored urine were obtained by catheterization. Microscopical examination showed an unusually large number of hyaline and granular casts, with many red blood cells and a few leucocytes.

The chemical analysis of the specimen was as follows: Reaction, acid; specific gravity, 1025; no sugar. Total nitrogen (Kjeldahl) = 2.66 grams; albumen (Esbach) = 2.5% (25 grams per liter); therefore, the non-albuminous nitrogen = 1.91 grams. Ammonia (Schlössing) = .16 gm. = 6.8%.

Nitrogen division.—Nitrogen precipitated by phosphotungstic acid = 1.31 grams.

Therefore,

Non-albuminous precipitate — N. =	.564 gm.	= 29.5%
Urea — N. =	1.189 "	= 62.2%
Amido acid — N. =	.141 "	= 7.3%

Treatment.—The patient was so ill on admission that an *accouchement forcé* was inadvisable. Induction of labor by a slow method with the simultaneous use of medicinal measures was thought to offer the only possible means of relieving her condition, though little if any hope was entertained of her recovery.

After stretching the internal os with a Goodell dilator until it had a diameter of 1 to 2 cm., a small rubber balloon was introduced into the uterus and inflated with normal salt solution, after which the cervix and vagina were packed with sterile gauze. Anæsthesia was not necessary during these precautions.

A vein was opened in the forearm and 500 cc. of blood allowed to escape, which was immediately replaced by a similar amount of 1% sodium bicarbonate solution given subcutaneously. A quantity of bile-stained fluid was washed out by gastric lavage, after which two ounces of Epsom salts and one drachm of sodium bicarbonate were left in the stomach. The patient was given a sweat bath at 9 a. m., but did not respond satisfactorily. Her condition gradually grew worse and she died at 10.45 a. m.

During the three and a half hours from the time of admission to the hospital until death she had no convulsions and was continually in profound coma.

Autopsy (Path. No. 2265) was performed four hours after death by Dr. W. G. MacCallum, whose notes were as follows:

Anatomical diagnosis.—Pregnancy, 7 months; chyliform ascites; generalized œdema; basal atalectasis of lung; focal necrosis in liver; erosion of mucosa of stomach; accessory spleen

Body of a very stout woman, 172 cm. in length.

On opening the peritoneal cavity, it is found to contain about two liters of an opalescent fluid. The peritoneum is smooth and glistening.

The pleural cavity contains a little of the same kind of fluid and its surfaces are smooth. The pericardium is free from excess of fluid, but all the tissues are œdematous.

Heart is not enlarged. Foramen ovale is open. All the valves are normal. The coronary arteries are not sclerotic.

Lungs: The left lung is everywhere crepitant, except in the lower and posterior portions where it is collapsed. The right lung presents a similar appearance.

Spleen weighs 220 gms. It is somewhat enlarged, and soft and flabby, but apparently normal on section. Adjacent to it are found two small accessory spleens.

Liver weighs 1590 gms., is remarkably firm and distinctly diminished in size, measuring 21 x 18 x 8.5 cm. Under the markedly thickened capsule numerous small, irregular hæmorrhages are seen upon the surface of the upper and lower parts of the right lobe.

On section inconspicuous focal areas of alteration in the liver tissue may be seen after careful inspection. They are opaque, yellow in appearance, and would seem about the size of three lobules. In general the lobulation is everywhere quite distinct. A few very small hæmorrhages are scattered throughout the liver substance.

Kidneys: The two organs are practically alike. The capsule strips off readily, leaving a smooth, rather pale, grey surface, on which the stellate veins stand out prominently. Fœtal lobulation is quite evident. On section the cortex is found to be 5 to 6 mm. in thickness. Its striations are quite straight. The labyrinthine portion is somewhat opaque. The straight tubules stand out definitely and are translucent. The glomeruli appear as prominent greyish dots.

Stomach is normal in appearance. Just below the pylorus there is a small erosion 4 mm. in diameter. The mucous membrane of the duodenum is œdematous. Pancreas is œdematous, but otherwise normal.

Thyroid is distinctly enlarged and measures 6 cm. in length and 3.5 cm. in width. In section, an increase in connective tissue is evident, otherwise there is nothing abnormal in the right lobe. In the left lobe there is a cyst containing a brown, colloid fluid. Parathyroids are apparently normal.

Œsophagus and trachea are normal. The gall ducts are normal.

Uterus measures 25 x 20 x 13 cm. and is normal in its external appearance. Cervix practically undilated and only admits tip of little finger. Canal intact. On opening the organ, the placenta is found attached to its anterior wall, and is separated from its attachment for a distance of 3 cm. from its lower edge. Beneath the placenta there is a blood clot 1 x 2 x 2.5 cm. and other clots are found between it and the internal os, the membranes having been dissected from the uterine wall. The partial separation would readily explain the bleeding from which the patient suffered during the last two weeks of life. Fœtus is a male, measures 24 cm. from vertex to sacrum and does not present any external abnormality.

Tubes and ovaries are normal. The left ovary contains the corpus luteum of pregnancy.

Microscopical examination.—Liver: Immediately around the portal vein a varying number of liver cells are necrotic and have been converted into a mass of hyaline material through which leucocytes are scattered. Sometimes these areas are infiltrated by hæmorrhage. The centers and middle zones of the lobules present a normal appearance, save that here and there foci occur in which the liver cells are swollen and almost transparent.

Spleen: Central portions of Malpighian bodies show fragmentation of the cells with formation of a coagulum. In the splenic pulp the vessels are sharply marked out. The fibrous tissue appears to be slightly increased.

Kidney: The glomeruli are normal. Epithelium of convoluted tubules appears somewhat ragged. The tubules contain some débris. There is an inflammatory exudate in the kidney.

Thyroid: Alveoli greatly enlarged, cells lining them are well preserved as a rule, though here and there they melt into hyaline masses with irregular outline, in which the nuclei are extremely small, deeply stained and shrunken; the colloid material is sometimes seen to extend between the cells.

Lungs: In some places the lungs show complete atalectasis, but for the most part they present no other changes than those seen in pulmonary œdema.

Thymus: Considerable remains are found in the form of long strands.

Bacteriology: Cultures from the various organs and the blood are negative.

The first record of a case in which eclamptic lesions were found in the liver at autopsy without a preceding clinical history of convulsive attacks is to be found in the Paris thesis of Bouffe de Saint Blaise in 1891. His patient was suffering from a profound toxæmia of pregnancy and was delivered by *accouchement forcé*. Death occurred a few days later from peritonitis. A similar instance was reported by Wendt in 1898, where the operation was immediately followed by a fatal post-partum hæmorrhage.

These cases were of considerable importance at the time in silencing the objections of Winkler and others, who urged that the hæmorrhages in the liver and elsewhere were the result of the eclamptic seizures and therefore not pathognomonic of the disease. They are also of great interest to us now, as they indicate that the characteristic organic changes in the liver may occur in pre-eclamptic toxæmia; but at the same time they cannot be placed in the same category with the two cases which I have just reported, since there is no evidence that convulsions might not have occurred had the patients not succumbed to complications incident to the mode of delivery.

In 1902, Schmorl placed on record three cases of eclampsia without convulsions, in which death occurred in coma, and autopsy revealed characteristic lesions. Subsequently two similar cases were reported by Meyer-Wirtz and Esch, respectively. These five cases are analogous to our own and supply a basis for comparison, as well as material for an analytical study of the condition. Labhardt, in a recent communication, incidentally mentions having met with a similar instance, but fails to give any clinical or pathological data.

CLINICAL COURSE.

The incidence of this type of eclampsia bears no relation to age, as the statistics indicate that women are subject to it throughout the childbearing period. A predisposition on the part of primigravidæ, and the onset of the condition in the second half of the pregnancy is seen, but in these respects it is entirely analogous to the usual form of eclampsia. Again, there is nothing characteristic in the relation of the disease to labor. While it has been observed more frequently before parturition, it may also occur during labor and in the puerperium.

The clinical history in all the cases gives evidence of the existence of a toxæmia prior to the appearance of coma. Such manifestations, however, are extremely variable and may persist through several months or last only a few days.

Headache and albuminuria with casts were invariably noted, although in one of Schmorl's cases albumin did not appear until shortly before death. Œdema, jaundice, nausea, and vomiting may occur as premonitory signs, but not necessarily. Preliminary visual disturbances were very common and would seem to possess a particular significance. Usually the patients complained of black spots before the eyes, dimness of sight or double vision, while Esch's case became totally blind and one of Schmorl's cases showed a left oculo-motor paralysis.

Consciousness usually disappears slowly. At first the patient is drowsy and stupid, later she becomes unconscious,

and finally passes into profound coma, the gradual transition occupying several hours. Occasionally, however, the woman has passed very suddenly from normal mentality to complete coma. Thus, in Meyer-Wirtz's case, the patient complained of intense headache and nausea two hours after delivery and quickly lapsed into deep coma. The duration of the coma has varied from 5 to 11 hours, except in one of Schmorl's cases, in which it seems to have persisted for a longer time, possibly 24 hours, although its exact duration cannot be determined from the data given.

CLINICAL SUMMARY OF CASES.

No.	Reported by	Age of Pt.	Para.	Variety.	Duration of Pregnancy.	Premonitory Symptoms.	Duration of Coma.	Obstetrical Condition.	Clinical Diagnosis.	Pulse.	Temp.	Respiration.
1	Schmorl.	22	I	Ante-partum.	6 mos.	Headache, jaundice, oedema, albumen and casts.	7 hours.	Undelivered.	Uræmia.	120	37.5 C.	Dyspnœa.
2	Do.	23	III	Do.	6 mos.	Headache, double vision, vertigo, left oculomotor paralysis, urine negative until just before death, no oedema.	Not stated.	Do.	Cerebral syphilis.	Rapid.	No note.	No note.
3	Do.	37	X	Do.	6 mos.	Headache, vomiting, sleeplessness, albuminuria with casts.	6 hours.	Do.	Uræmia.	Do.	37.3 C.	Do.
4	Meyer-Wirtz.	38	I	Post-partum.	9 mos.	Headache, cyanosis, albumin with casts.	5 hours.	Delivered spontaneously.	(?)	96	37.5 C.	Temporary cessation.
5	Esch.	25	I	Intra-partum.	10 mos.	Headache, dim vision, vomiting, albuminuria, total loss of sight, no oedema.	11 hours.	Undelivered.	(?)	84	39.7 C.	Deep and stertorous.
6	Siemons.	27	IV	Post-partum.	10 mos.	Headache, oedema, albuminuria with casts.	6 hours.	Delivered spontaneously.	(?)	46	98.4° F.	Stertorous.
7	Do.	33	I	Ante-partum.	7 mos.	Headache, oedema, double vision, vomiting, albuminuria with casts, premature separation of placenta.	7 hours.	Undelivered.	Uræmia.	84	99.2° F.	Periodic.

The temperature is usually normal, but finally became elevated to 102° and 104° in the cases of Meyer-Wirtz and Esch, respectively. The pulse rate is not characteristic; more frequently it is slow at the onset of the coma and later becomes rapid, ranging between 120 and 160 to the minute. The usual findings are similar to those represented in the preceding chart, which also gives the only blood pressure observations that have been made in any of the cases. Irregularities in the force or the rhythm of the pulse have received slight mention.

The character of the respiration was commented upon in five of the seven cases. Deep stertorous breathing was noted by Esch, as well as in our first case, while dyspnœa occurred in one of Schmorl's cases. Respiration ceased in Meyer-Wirtz's patient at the onset of coma, but was re-established by artificial means; while our second case exhibited most marked irregular breathing, which differed from typical Cheyne-Stokes' respiration only in that there was no period of complete apnœa.

Pathology.

The pathological findings in all these cases have conformed to the anatomical picture of eclampsia, so that there can be no doubt as to the accuracy of the diagnosis. Indeed, the only question is, as to why the disease should occasionally run its course unattended by convulsions. Schmorl's explanation is that the eclamptic toxin is analogous in its action to certain drugs which have a stimulating effect when given in small doses, but cause depression and paralysis when administered in larger amounts. He is, therefore, inclined to regard such cases as manifestations of a more profound intoxication than occurs in the usual type of eclampsia, and ascribes the absence of fits to an overpowering of the central nervous system.

The truth of this hypothesis cannot be confirmed or denied until we have the poisonous principle in our hands. Meanwhile, it is of interest to study the anatomical changes exhibited by the seven cases reported with a view of ascertaining whether any organic lesion is constantly accentuated in non-convulsive eclampsia; and if so, what?

Pathological Summary.

Renal lesions were demonstrated in all cases, excepting that of Esch, in which the kidneys were not examined; but even in his case the clinical analysis of the urine afforded conclusive proof of the existence of a nephritis, as it showed a very large amount of albumin and numerous tube casts. In three instances there was evidence of a chronic nephritis with superimposed acute changes, while the three remaining cases presented only an acute parenchymatous degeneration. The intensity of the renal affection however, is notably inconstant, varying from a very mild, cloudy swelling of the epithelium to extensive destruction of tissue by hæmorrhage and necrosis.

The liver, without a single exception, presented characteristic necroses at the periphery of the lobule. Sometimes there was only a slight involvement of the organ, the necrosis not passing beyond the cells immediately adjoining the portal spaces. In other instances, large areas of the parenchyma were thrown out of function by degenerative processes and the extravasation of blood. Between these extremes, various gradations were noted, so that no connection can be established between the non-convulsive type of eclampsia and the intensity of the liver lesion. Similarly the heart and lungs

fail to show any more marked involvement than in typical eclampsia, although degeneration of the myocardium, and pulmonary œdema were observed in all the cases. Likewise, serous effusions into the peritoneal, pleural and pericardial cavities occurred in all the cases in which an especial autopsy note was made concerning the condition.

In contradistinction to the other organs, the brain in these cases was the seat of unusually severe lesions, which seem to be of such importance that I give a somewhat detailed account of the findings recorded in the literature.

SUMMARY OF PATHOLOGICAL ANATOMY.

No.	Reported by	Kidney.	Liver.	Spleen.	Pancreas.	Stomach.	Lung.	Heart.	Serous Effusion.	Brain.	Bacteriology.
1	Schmorl.	Acute upon chronic nephritis.	Peri-portal necroses.	Enlarged.	No note.	Punctiform hæmorrhages.	Œdema.	Parenchymatous degeneration and punctiform hæmorrhages.	No note.	Hæmorrhage and œdema.	Negative.
2	....Do.....	Parenchymatous degeneration.	....Do.....	No note.	Focal necrosis.	....Do.....	....Do.....	....Do.....	....Do.....	Dura distended by cerebro-spinal fluid hæmorrhage.	....Do.....
3	....Do.....	Acute upon chronic nephritis.	....Do.....	....Do.....	....Do.....	....Do.....	....Do.....	....Do.....	....Do.....	Hæmorrhage into cerebrum, cerebellum, pons and medulla.	....Do.....
4	Meyer-Wirtz.	Parenchymatous degeneration.	....Do.....	....Do.....	No note.	Negative.	Negative.	Fatty degeneration.	Pleural and peri-cardial.	Cerebral apoplexy.	....Do.....
5	Esch.	Not examined.	....Do.....	Enlarged.	....Do.....	No note.	Œdema.	Punctiform hæmorrhages.	....Do.....	Hæmorrhage into lateral ventricles.	No note.
6	Siemons.	Acute upon chronic nephritis.	....Do.....	Congulum in malpighian tufts.	....Do.....	Negative	....Do.....	Parenchymatous degeneration.	Pleural, pericardial, peritoneal.	Details not obtainable.	B. aerogenes capsulatus.
7	....Do.....	Parenchymatous degeneration.	....Do.....	....Do.....	Œdematous.	Small fresh ulcer.	....Do.....	....Do.....	....Do.....	No examination.	Negative.

Schmorl's cases. No. 1: Meninges hæmorrhagic and œdematous. On the cortex multiple punctiform extravasations of the blood. In the central ganglia bluish red areas of softening, the size of a lentil. A similar focus in the left hemisphere of the cerebellum. No. 2: Dura under marked tension. Flattening out of convolutions. A hæmorrhagic area 3 to 4 cm. in diameter at base of left frontal lobe in subarachnoid space. Destruction of left olfactory and oculomotor nerves by hæmorrhage. Thrombosis of left cavernus sinus. Apoplectic focus, size of walnut in left frontal lobe. Multiple punctiform hæmorrhages over cortex. Areas of softening in cerebellum and central ganglia of variable dimensions, largest the size of a pea. No. 3: Punctiform hæmorrhages unusually abundant, and areas of softening throughout cerebrum, central ganglia, pons and medulla.

Meyer-Wirtz's case. Pia œdematous. Diffuse hæmorrhages on right side of temporal and parietal convolutions. 30 cc. of bloody fluid in posterior cranial fossa. Diffuse subpial hæmorrhages at base of brain in temporal region, as well as at boundary between cerebellum and pons. Blood clots on posterior surface of medulla and at point of exit of vagus. Lateral ventricles distended, containing bloody fluid. Substance of hemisphere pale, but of good consistence. Hæmorrhage into corpus striatum on right side, which extends into lenticular nucleus and internal capsule. Nucleus caudatus free, as also pedunculus cerebri. Extensive hæmorrhage in pons. Aqueduct of Sylvius and fourth ventricle filled with clots. Cerebellum negative.

Esch's case. Under posterior part of right parietal lobe there is a large extravasation of blood. On sectioning the brain, one finds single, punctiform hæmorrhages scattered throughout its entire substance. Hæmorrhage size of hazelnut in posterior part of right corpus striatum. Both lateral ventricles, and especially the right, are distended with bloody fluid.

The profound nature of the brain lesions noted here affords a probable anatomical and physiological basis for the unusual clinical course in this variety of eclampsia, and suggests at least two possibilites. In the first place the location and extent of the hæmorrhage into the brain substance could be such as to explain both the onset of coma and the absence of convulsions. The material at present available, however, speaks against the very frequent occurrence of this, and would rather seem to favor a second possibility, namely, that the phenomena in question are due to an increase in the intracranial tension, which in turn depends upon hæmorrhagic or œdematous changes in the brain or its enclosing membranes.

Rosenstein, who formulated his theory in accordance with the experiments of Traube and of Munk, formerly laid great emphasis upon the part played by increased intracranial pressure in the production of eclampsia. He held that increased arterial pressure and hydræmia were commonly observed in eclampsia; and that both of them caused an increase in intracranial tension; so that all of the symptoms of the disease could be interpreted as results of these changes. His hypothesis was ultimately abandoned, because the cerebral condition which supplied its basis was frequently lacking at autopsy. However it would seem that the brain lesions observed in these cases of eclampsia without convulsions strongly indicate, if they do not absolutely assure, a greatly increased intracranial pressure. Thus, hæmorrhage into the ventricles or beneath the meninges, œdematous changes in the brain

itself, or in the meninges have been found with great regularity. The dura has been seen to be markedly distended, the convolutions of the brain flattened out, and the cerebro-spinal fluid present in excessive amount; and all of these phenomena lead to the production of a high intracranial pressure.

The effect of an increase of tension within the skull is dependent upon the anæmia of the brain and medullary centers which follows it. This bears a very direct relation to the mean arterial pressure, as Cushing has shown that the blood supply to the brain is cut off when the resistance within the skull is greater than the force impelling the blood stream. The existence of this state of affairs may be accurately demonstrated only by comparing the pressure in the peripheral arteries with that in the cerebro-spinal fluid after trephining the skull and directly estimating the pressure within the cranium. However, no such observations have been made in cases of eclampsia without convulsions. Neither are we in possession of clinical data obtainable by a less radical procedure which would afford presumptive evidence of its existence, namely, a comparison of the pressure in the peripheral arteries with that in the spinal canal as determined by lumbar puncture. The importance of such observations in the future for the interpretation of the pathological physiology underlying eclampsia without convulsions is evident.

In our own cases the anatomical data at hand throw no light on the subject of intracranial tension. In the first case the intracranial conditions were not thoroughly studied at autopsy; while in the second, permission could not be obtained to open the skull. However, in this latter patient, who came under my personal observation, the clinical manifestations indicated the existence of an increased intracranial tension; as a marked elevation in blood pressure associated with periodic breathing is especially significant according to recent studies on Cheyne-Stokes' respiration.

Following the work of Cushing, which demonstrated in the event of an increase in the intracranial tension that the arterial pressure tends to rise and exceed the former, Eyster has been able to explain the association of "Periodic Breathing" with such conditions. The phenomenon would seem to depend upon "an alternation of anæmia and blood supply to the brain and medullary centers," as is shown by the blood pressure consecutively mounting above and falling below the line of intracranial tension, thus giving rise to the so-called Traube-Hering waves.

From his experimental and clinical work Eyster concludes that the existence of increased intracranial pressure in a patient may be definitely recognized when Cheyne-Stokes' respiration occurs "accompanied by a rise of blood pressure and an increase of pulse rate during the dyspnœic periods." The diagnostic value of these data and the importance of the changes in the eye grounds lately studied by Cushing and Bordley were not appreciated at the time our cases occurred, and we are, therefore, unable to make any statement concerning them. We do feel, however, that the clinical observations which were made, very strongly indicate a high tension within the cranium.

Diagnosis.

The clinical diagnosis in these cases has invariably been wrong. Most often the condition has been mistaken for uræmia, which is not surprising in view of the frequent history of long standing renal disturbance and the autopsy findings of chronic nephritis. Suicidal poisoning, cerebral syphilis and acute yellow atrophy were seriously considered several times, until the anatomical lesions revealed the true nature of the disease.

For the present we must admit that only the pathologist can make an absolutely positive diagnosis of eclampsia either with or without convulsions; and that his ability to do so will depend upon the demonstration of peri-portal necroses in the liver. This lesion, constituting the one constant feature of the disease, must be present to justify the diagnosis. The absence of it in the case lately reported by Reinecke effectually proves that his was not a case of eclampsia without convulsions.

Clinically, we remain unable to identify the disease positively at the bedside; since as I have already indicated, the obstetrician may meet on the one hand with various conditions besides eclampsia which are associated with convulsions and coma; while on the other, eclampsia may occur without giving rise to a single convulsive movement. Very fortunately, our inability to make an accurate clinical diagnosis is of but slight practical importance, since most of the affections with which eclampsia may be confused are manifestations of some variety of toxæmia of pregnancy and are, therefore, amenable to the same therapeutic measures. From a scientific standpoint, on the other hand, it is exceedingly important to differentiate, as far as possible, the several varieties of toxæmias, and at present this can be effected only upon a pathological basis. Failure to bear this in mind will result in great confusion and naturally delay the fuller recognition of our great ignorance and the subsequent development of more correct ideas.

Indeed, the anatomical evidence is so essential for the differentiation of every toxæmia of pregnancy that it is impossible to classify with certainty the cases reported by Lebenstein, Binder, Schlutius, and Jardine, in which recovery finally occurred. All of their patients were comatose for a time, having no convulsive seizures, while the urine changes were indicative of nephritis. It cannot be denied that these may have been instances of eclampsia without convulsions; but on the other hand, since positive anatomical proof as to their exact nature cannot be adduced, it would appear wiser to leave the diagnosis *sub judice*.

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NOTES ON NEW BOOKS.

Morris's Human Anatomy. Edited by HENRY MORRIS, M. A., M. B., F. R. C. S., and J. PLAYFAIR MCMURRICH, A. M., Ph. D. In five parts. (*Philadelphia: P. Blakiston's Son & Co., 1907.*)

The fourth edition of Morris's Anatomy, while still retaining to some extent its original character, has been in many respects profoundly altered. The Basle nomenclature has, generally in anglicised form, been used throughout. The sections on the muscles, central nervous system, organs of respiration, nose, ear, integument and perinæum have been practically rewritten, and the general arrangement has been somewhat altered to fit morphological, and in some cases physiological, rather than regional requirements; thus the old Section VII on the thorax has been omitted, the heart is treated with the blood vessels, the thyreoid and thymus glands are placed in a special section with the other ductless glands, and the mammary gland is treated with the integument.

Part I consists of the sections on general morphogeny, bones, and joints. Of these the first is entirely new, and is short but extremely concise and clear, and forms a very useful addition to the book. The section on osteology, which has always been known as one of the best features of this work, has undergone slight alteration, but is improved by the addition of several excellent figures. Unfortunately, the usefulness of this section has been considerably marred by the somewhat capricious rejection of many of the BNA terms. It may be urged that an author in writing or revising an article has a perfect right to use the terms which he thinks most suitable; here, however, the case is somewhat different.

The present edition of Morris is likely to be used by anatomists who recognize in the BNA an earnest endeavor to reduce a burdensome nomenclature to its simplest and most consistent proportions, and while they may not look upon it as perfect, any more than did the men who gave up so much time to its elaboration, they realize that much good may be achieved by its use, and that use alone will lead to future improvement. Under these circumstances, consistency becomes a point of the first importance, and the article, as it at present stands, is somewhat disappointing. Thus *Sinus tarsi* is as good a term as *Sinus pedis; superior* and *inferior* rami of the pubes are much preferable to *ascending* and *descending*. There seems no particular reason why the *epicondyles* of the humerus should be accepted rather than those of the femur. *Glenoid fossa* is not more desirable than *Mandibular fossa*. *Infratemporal fossa* has been practically rejected, at least it seems only to be used once to about nine times of *Zygomatic fossa*.

Professor Thompson uses *volar* and *dorsal* for the surfaces of the radius and ulna, but not for the borders; *medial* and *lateral* angles of the scapula are preferable to *superior* and *external*, and so are the terms *medial* and *lateral* for the surfaces and malleoli of the tibia and fibula. In the cases of *Tuberculum articulare*, *Foramen palatinum majus* and *Sinus transversus*, the object of uniformity has been defeated by the frequent use of the corresponding terms of the older nomenclature.

In revising his well-known and excellent section on arthrology, Mr. Morris has done little but employ the Basle terms. This has been done consistently, except in the cases of *Tuberculum articulare* and *Fossa infratemporalis* which, as in the previous section, have been overlooked.

Part 2 on the muscles and vascular system contains many improvements. The difficult task of entirely recasting the section on myology on a purely morphological basis, has been most successfully accomplished by Professor Bardeen. This change is very welcome; amongst numerous other advantages, we at last have the anconeus treated naturally as part of the triceps, and the oblique and transverse muscles of the thorax and of the abdomen considered together. In the case of the transversus thoracis, this would seem a good opportunity to have called the lateral attachment the *origin*, and the medial the *insertion*, and thus bring about conformity with the more important abdominal portion of the muscle.

Naturally there are a few points which might be improved in a later edition; for instance, in the description of the rectus sheath (p. 414) the terms *ventral*, *external*, and *front* have been used to denote the same surface of the muscle, where possibly more uniformity might have led to a clearer result. There also seems to be room for a more definite descrfption of the upper part of the sheath.

The word *supine*, used on page 374 with regard to the position of the Antibrachium in quadrupeds should, no doubt, read *prone*. The whole section, however, is extremely well done, and contains much valuable information, drawn not only from an extensive knowledge of the literature, but also from the results of the author's own work.

Section V on the organs of circulation is principally distinguished by the part devoted to the lymphatic system, which, as might have been expected of Professor Sabin, who has done so much to increase our knowledge on this subject, is very much in advance of anything that has hitherto appeared in an English or American text-book on human anatomy. The part on the blood-vascular system has been improved by the addition of several figures, and by a good account of MacCallum's work on the architecture of the heart.

The statement on page 492 that the atrio-ventricular bundle "inserts into the ventricular septum" is misleading in two ways; firstly, because it can scarcely be called an adequate description of the extensive ramification of the ultimate fibers of the bundle in the ventricular walls, and secondly, because it implies a mechanical influence which this bundle may possibly possess, but of which we have no experimental proof. At present we know the atrio-ventricular bundle as a conductor only.

The significance of the so-called moderator band as a means of conveyance of a part of the right ventricular limb of the atrio-ventricular bundle from the ventricular septum to the anterior musculus papillaris, appears to have escaped notice. The constancy, or relative prominence of this band in the sheep as compared to man (referred to on p. 486), or, for that matter, its relative prominence in any mammal depends simply on the size of the anterior papillary muscle as compared to its fellows, and on the position of this papillary muscle with regard to the ventricular septum.

On page 623, in speaking of the articular arteries of the knee, the terms *medialis* and *media* (azygos) have both been translated *medial*, *middle* would have been a better rendering of the latter.

There is some inconsistency in occasionally using the terms *internal* and *external* for *medial* and *lateral* in referring to the plantar and cancaneal arteries; in adjusting this, Figure 465 requires re-labelling.

Part III deals with the nervous system and special sense organs. In the section on neurology, the part relating to the central nervous system has been entirely rewritten with considerable expansion. Professor Hardesty has handled this subject with admirable judgment, his article is sufficiently full without excess of detail, and the style in which it is written is a model of simplicity and clearness.

The excellent section on the eye has undergone little or no change. The parts relating to the ear, tongue, and nose have been very ably re-written by Professor Kerr, although in the two latter cases the employment of the terms *dorsal* and *ventral* in a proverbially difficult situation, has led to a result not entirely free from ambiguity. Thus the following description does not seem quite clear. "The external nose is shaped like a triangular pyramid. At the forehead, between the eyes, is the root of the nose, and from this extending inferiorly and ventrally, is a rounded ventral border, the dorsum of the nose, ..."

The direction *ventrally*, in this case, is somewhat arbitrary, it is obviously used as opposite in direction to the back of the head which is considered as dorsal; we have only to consider the top of the head as dorsal (which would be equally valid) to make the directions *ventrally* and *inferiorly* coincide. In the tongue the tip has been considered as *ventral* and the root as *dorsal*, whereas the dorsum might equally well, perhaps better, be considered as dorsal and the attached surface as ventral. Having admitted, as Professor Kerr does, the directions *superior* and *inferior*, the use of the terms *anterior* and *posterior* would have added considerably to the clearness of the descriptions.

In Part IV, the section on the organs of respiration has been excellently re-written by Professor Terry. "The structures at the pelvic outlet," a rearrangement of the old part on the Perinæum which it replaces, has been very ably written by Professor Thompson, and is now practically a new article, as is also Section XII on the skin and mammary gland by Professor Kerr.

The remainder of this volume has been revised without any very radical alteration. The section on the organs of digestion, revised by Professor Huber, has undergone little change, except for some additions on development which are excellent, particularly the accounts of the development of the peritoneum and intestine, which together replace the well-known section on the evolution of the peritoneum of former editions. Dr. Huber has also added notes on development in the section on the ductless glands and a short account of the parathyroids.

Professor McMurrich in revising the section on the genito-urinary organs, has rewritten the account of the development of the reproductive organs. Henle's section of the female pelvis in which the uterus is retroverted, has been replaced by a figure in which the parts are normal.

Part V on surgical anatomy has been thoroughly revised, and, like everything from the pen of Mr. Jacobson on the relations of anatomy to surgery, it is full of interest. The extraordinary amount of practical information crowded into this section without the slightest ambiguity of expression, marks it as a piece of work of a very high order.

The adoption of the Basle nomenclature for the first time in a text-book on human anatomy in the English language, is a most important step, and one on which the editors are to be congratulated, particularly as in doing this they have produced an extremely good work which deserves to be widely used. H. D. S.

International Clinics. Vol. III, 17th Series. (*Philadelphia and London: J. B. Lippincott Company, 1907.*)

These "Clinics" are so well known and so justly appreciated by the profession that little more need be said about this volume than enough to draw attention to its appearance. Twenty-five authors, nine of whom are foreigners, have contributed the 25 papers of this volume, dealing with treatment, medicine, surgery, gynecology, genito-urinary diseases, ophthalmology, neurology, dermatology, and pathology. The editors are to be complimented on their success in the preparation of the "Clinics," in keeping

an even balance of all the different departments mentioned. No section of medicine, taken in its broadest sense, receives more or less than its due attention. All the papers submitted are timely, and many of them are excellent reviews of the present status of certain problems not yet elucidated, on which much work is being done, and which are because of their inherent difficulties little understood by the general practitioner, for instance Leo Loeb's article on the "Inoculability of Tumors, and the Endemic Occurrence of Cancer." R. N.

Manual of the Diseases of the Eye, for Students and General Practitioners. By CHARLES H. MAY, M. D. Fifth Edition, Revised. (*New York: Wm. Wood & Co., 1907.*)

This excellent manual which, since its publication in 1900, has reached a fifth edition and has been translated into several foreign languages, is too well known to need extended notice. The remarkable success which it has met with and its popularity abroad as well as at home are to be attributed, it would seem, to its conciseness—its "multum in parvo" character—the convenient arrangement of the subject matter, and perhaps in no small degree to the great number and excellence of the illustrations. These unquestionably add materially to the value of the book, and, except for the somewhat "florid" character of the colored plates representing the superficial diseases of the eye, are deserving only of commendation.

In view of the fact that the work has passed through five editions, and that "every page," as the author tells us in the preface to the present edition, "has been carefully examined," we have been somewhat surprised at the number of "slips" which a not very critical perusal of the volume has brought to light.

For example, in discussing the treatment of sympathetic ophthalmitis, the author tells us on page 161 that "enucleation of the injured eye has no effect upon the progress of the disease," while on the next page he advises enucleation under certain circumstances, "since its [the exciting eye's] presence may aggravate the condition of the sympathizing eye."

Again, the definition of "ametropia" on page 270 is not broad enough to include astigmatism, which, of course, it should be. The statement (page 276): "If the patient reads 20/xx, we may assume the absence . . . . . of astigmatism" is erroneous, and it would not be true, even if the author had qualified it by saying "astigmatism of significant amount."

Again, in the description of the optometric use of the ophthalmoscope by the direct method (page 279) we read: "The examiner, if ametropic, corrects his error by wearing suitable glasses . . . . or by subtracting the amount of his error from the result which he observes in the examination." Whether the examiner's error should be subtracted from or added to the ophthalmoscopic finding will depend, of course, upon the nature of his own and the patient's refractive fault. Thus, if the examiner with $2D$ of myopia is able through a $+4D$ lens to see distinctly the details of the patient's eye-ground, the patient's hypermetropia is $4D + 2D = 6D$, not $4D - 2D$. In an algebraic sense the author's statement is correct, but only if one thinks of myopia as having a negative and of hypermetropia as having a positive value.

The diminution in the acuteness of vision we are told (page 302) "is least with simple astigmatism, more with compound astigmatism, most with mixed astigmatism." It seems hardly necessary to point out the error involved in this statement, for everyone who has to do with faults of refraction knows that in a high grade of simple astigmatism vision is commonly more markedly impaired than in a relatively low degree of compound or even mixed astigmatism.

On page 348 "orthophoria" is given as one of the "various forms of heterophoria." The statement at the top of page 352 should read: "But if there is [*lateral*] heterophoria," etc. In this connection, furthermore, we would suggest that in employing the Græfe vertical diplopia test, it is much better to use a 4-degree prism for the distance and a 7-degree prism for the near than to use one of 10 degrees for both far and near, as the author advises, since the possibility of error from inexactness in the position of the prism increases with the strength of the prism employed.

Weber, we are inclined to think, would be somewhat surprised if told that Fig. 85 (page 59) represents his probe-pointed canaliculus knife.

However, these errors are of minor importance, are easily rectified, and detract but little from the general excellence of the book. S. T.

Genito-urinary Diseases and Syphilis. By H. H. MORTON, M. D. Second edition. (*Philadelphia: F. A. Davis & Co., 1906.*)

It is unfortunately true that the standard of the average American text-book on genito-urinary diseases is rather poor, but the above volume is certainly not destined to raise the already low standard.

We are advised in the preface to this new edition that the rapid advances in many fields of genito-urinary surgery have rendered imperative a revision of the old edition. It is fortunate that the author has acquainted us of the fact that advances have been made, as a perusal of this new edition fails to impress one with that fact.

The anatomical material is handled in the most elementary and school-boy fashion and often most curious anatomical statements are made. For instance, in dealing with the anatomy of the urethra (page 23) we are told "the urethra is a tube open at both ends." This tube the author divides into three regions, the "anterior or pendulous urethra, the membranous and the prostatic urethra." This division of the urethra we must admit is quite original, for it is not usual in works on the anatomy of the urethral tract to speak of the pendulous as synonymous with the anterior urethra. According to this division the pendulous portion extends back to the membranous which, to say the least, is a very curious and not at all accepted idea as to what constitutes the pendulous urethra. On page 24 the author presents a most wonderful anatomical diagram of the urethra and bladder. In this diagram the ejaculatory ducts are shown traversing an empty space between the prostate and the posterior wall of the bladder to open in the prostatic urethra without passing through the prostate gland. Furthermore, the apex of the prostate is the only portion of the gland in any way connected with the urethra, while the suspensory ligament is shown attached to the lower end of the pubis and the anterior part of the prostatic urethra.

Such mistakes are absolutely inexcusable and almost inconceivable.

It is not our purpose to take up in detail the various points deserving of criticism, but we cannot help referring to the chapter on chronic prostatitis. On reading the symptoms of chronic prostatitis as handled by the author, one would imagine he was dealing with the text-book of 50 years ago rather than a revised, supposedly up-to-date edition of a genito-urinary text-book.

We have referred to these few points in the volume, not because they are the only ones requiring criticism, but because they give some idea of the character of the book. It is a volume which certainly does not deserve a position in the library of the student or practitioner.

Green's Encyclopedia and Dictionary of Medicine and Surgery. Vols. I, II, and III. (*Chicago: W. T. Keener & Co., 1906.*)

These three volumes are direct descendants of the *Encyclopedia Medica*, but contain, in addition to the elaborate articles of that work, many new and more distinctly dictionarial paragraphs. That is to say, the editor has aimed, as the title of the work indicates, to produce a dictionary and an encyclopedia in one; he has

had, obviously, great difficulties to contend with in attempting to keep such extensive material within dimensions that were at all manageable; but he has succeeded notably. The articles are concise and complete; no words are wasted in them, and it is difficult to see how the necessarily limited space allotted to the contributors of such a work could have been better used.

One of the most useful features of the encyclopedia is the admirable system of what the editor calls "illuminating cross references"; it is a feature which must have involved an endless amount of Dr. Ballantyne's time and energy; and its excellence proves that the editor has been something more than a figure-head.

Such a work as this encyclopedia must, of course, be incomplete and unsatisfactory in places. When one considers that it must treat such subjects as "Anthropology," and "Linguistics," and "Physiology of the Brain" within the limits of a very few printed pages, one realizes that it is absurd to expect of it the completeness which is possible for the average text-book. The choice of essentials has, however, been wisely made.

Metabolism and Practical Medicine. By CARL VON NOORDEN, Professor of the First University Medical Clinic, Vienna. Anglo-American Issue under the Editorship of I. WALKER HALL, Professor of Pathology, University College, Bristol, Pathologist to the Bristol Royal Infirmary. Vols. 1 and 2, pp. 525. (*Chicago: W. T. Keener & Co., 1907.*)

The timely appearance of this comprehensive work on metabolism in its direct bearing on practical medicine will be heartily welcomed by all who are interested in this extremely important branch of medical science. While some of the most important results thus far attained in the field of metabolism have been contributed by Americans working in purely scientific institutions, the practical medical men of America, with few exceptions, have been singularly slow in entering this very promising field of work. The appearance of this work will probably stimulate much needed investigations in this field as many important and practical questions are awaiting solution. The work will apparently be complete in three volumes of which the reviewer has only two before him. The various articles were written by well-known German authorities and rendered into English by a corps of translators. Volume I deals with the physiology of metabolism. The general style in this volume is not clear and in places unscientific. Numerous errors are also to be found in it of which only a few can be noted here. On p. 154 the statement is made that "Fructose and glucose are thereby first transformed into grape-sugar." On page 157 it is stated that acetanilid contains two atoms of carbon. It is impossible in this case to make out what the author had in mind. Later in the same paragraph the statement occurs that "'carbohydrate fat' is fairly stable, and melts early with higher temperatures, ..." In the discussion of the acetone bodies the term acetic acid is used throughout in place of aceto-acetic acid, although the formulas are correct for the latter. Sentences such as the following are not sufficiently infrequent in the first volume. "What part is played biologically by the valence of albumin (regarded both as a sub-alkaline and as an acid-binding body) which has been discovered by Loewy's experiments is, for the main part, unknown."

The second volume is written on an altogether higher plane and will be a valuable addition to any medical library. It deals with the medical phases of the subject. The chapters bear the following headings: Hunger and Chronic Starvation, Overfeeding, Fever and Infection, Diseases of the Stomach and Intestines, Diseases of the Liver, Diseases of Respiration and Circulation, Diseases of the Blood, Diseases of the Kidneys.

In this volume a mass of data widely scattered in the literature is presented and the discussions are comprehensive and lucid. At the end of each discussion a good bibliography will be found. The second volume is to be especially recommended to the medical public.

A. S. LOEVENHART.

The Cause and Prevention of Beri-Beri. By W. LEONARD BRADDON, M. B., B. S., F. R. C. S., State Surgeon, Negri Sembilan, Federated Malay States. (*New York: Rebman Company, 1907.*)

In his preface the author states that "this work consists chiefly of a report presented to the Colonial Office in May, 1904. . . . In the present work I have sought as far as possible to omit all mere opinions, and to present the reader with the evidence of *facts*. If, therefore, it seems presumptuous to claim, as I do, that in this book a problem which has vexed medicine for centuries receives solution, that the cause and prevention of beri-beri are clearly and certainly shown, the appeal is not to the author's opinions, but to the facts recorded for justification." It is doubtful whether all the readers of this work will agree with the author in thinking that he has solved the problem, but none can fail to recognize the large amount of work the author has put into his task, and the care with which he has studied the subject. The reviewer feels, however, that as with Hutchinson's theory as to the decayed fish origin of leprosy there is still a link in the chain wanting to prove absolutely that bad rice is the cause of beri-beri. It is perhaps not quite fair to state simply the author's conclusions in this question, but it is not possible to consider each one and discuss it at length. This would necessitate such a review of the subject as the author has given us. It is done, however, to interest other readers in this report, which is a most admirable one, for which the author deserves the highest credit. It is to be regretted that the book will probably not be much read in this country where as yet beri-beri is practically unknown, but it will be of service to those who are interested in studying obscure problems of this nature by showing them how a first-class report should be written. Dr. Braddon's conclusions are as follows:

1. "Stale decorticated (white) rice, therefore, at times contains a poison, the effect of which is to produce beri-beri."

2. "The agent which produces the poison in rice is specific of, or peculiar to, that grain."

3. "The beri-beri poison is not preformed (or not present in quantity sufficient to cause symptoms) in normal fresh rice-seeds, but is adventitious."

4. "The pericarp of rice, like the seeds when fresh, contains little or no poison."

5. "The formation of poison in stale rice is due to the action of a specific agent upon the dead seeds."

6. "The poison of stale rice has an antecedent in fresh rice. The agent must be, therefore, some ferment or parasite or epiphyte peculiar to fadi [the raw grain]."

7. "The beri-beri poison is probably an alkaloid which is stable and non-volatile, and resembles atropine and muscarine in some of its effects."

8. "The formation of poison in stale rice is probably due neither to fermentation nor to bacteria, but to the growth in it of a special fungus."

9. "The beri-beri producing fungus of rice is probably a surface-parasite, or epiphyte affecting the seed saprophytically after decortication."

10. "The specific fungus of beri-beric rice is, like that of toxic rye and lolium, probably a parasite affecting the surface of the seed."

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